

UNITY OF COMMAND AND INTERDICTION

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COL DANIEL P. LEAF

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Unity of Command and Interdiction



By

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Foreword

The cover of Joint Publication 1, *Joint Warfare of the U.S. Armed Forces*, says, "Joint Warfare is Team Warfare." Inside the publication, an Air Force officer observed, "A few years ago I was taught that jointness basically meant getting everybody lined up shoulder to shoulder. Now I know that real jointness means attacking the right target at the right time." That quote makes joint warfare sound like a simple matter, one that the U.S. military has well in hand. Although the services have made great progress over the last decade or so, *Unity of Command and Interdiction* highlights an area where there is still a great deal of work remaining.

The Army and Air Force have been at odds about how to fight together where their missions overlap the most. Beyond the front lines 30 to approximately 200 kilometers is a gray area where Army deep operations and Air Force interdiction overlap. They often address the same target sets and compete for the same weapons. The Army competes for limited Air Force assets, and when available, wants to fire their own long-range weapons into the area with very few restrictions. Other Air Force-developed targets, either for strategic attack or interdiction further behind the lines, compete for the assets as well.

Synchronizing interdiction and land maneuver is not a new problem, but several new twists are complicating the matter even more. Army doctrine calls for fast-paced and deep maneuver, supported by attack helicopters and artillery. Army artillery ranges have increased over fivefold with rockets and missiles; at the same time technological advances dramatically improved interdiction capabilities. Tactical ballistic missiles and the proliferation of weapons of mass destruction are other pieces of a very difficult battlefield puzzle.

Colonel Leaf sees unity of command as essential to success for both services. His exhaustive study of the topic highlights the evolution of interdiction warfare, deep operations, and interservice issues. He has managed to avoid getting mired in details and acronyms without missing the key points. His recommendations are straightforward, and offer an objective approach to unity of command for theater interdiction. Regardless of your perspective, his report merits your consideration.

JAMES M. HURLEY, Major General, USAF
Director of Plans and Programs

About the Author



Colonel Leaf completed this study while assigned to the Airpower Research Institute (ARI), Air University Center for Aerospace Doctrine, Research, and Education (AUCADRE) at Maxwell Air Force Base, Alabama. He earned his bachelor of science degree in political science from the University of Wisconsin in 1974, and a masters degree in military art and science from the Command and General Staff College in 1986.

Commissioned from the Air Force Reserve Officer Training Corps in May 1974, he completed pilot training at Columbus AFB, Mississippi, in November 1975. He was assigned to George AFB, California, for initial F-4 training, then served as an F-4D aircraft commander at Holloman AFB, New Mexico. From August 1978 to April 1980 he served at Osan Air Base, Republic of Korea, as a forward air controller, instructor pilot, flight examiner, and chief of group standardization and evaluation. He left Korea for Hickam AFB, Hawaii, and duty as major command project officer and flight examiner until March 1981 when he began F-15 training enroute to Kadena Air Base, Japan. At Kadena, he was a flight commander, instructor pilot, and standardization and evaluation branch chief until June 1985. Returning from overseas, he attended the Command and General Staff College (CGSC) at Fort Leavenworth, Kansas, graduating with honors in June of 1986. He remained at Leavenworth on the CGSC faculty as Air Force representative and chairman of the faculty council through May 1988. He reported to Luke AFB, Arizona, in June of that year, and served as chief of standardization and evaluation until he became the 426th TFTS operations officer in January 1989. He took command of the *world famous and highly respected Triple Nickel* on 18 May 1990 and during his tenure, the 555th was the 405th Tactical Training Wing Top Gun Squadron and won the Frank Luke Trophy as Luke AFB's best fighter squadron. He commanded the 58th Operations Support Squadron from its activation 1 October 1991 until May 1992. Selected in early 1992 to attend Air War College (AWC), Colonel Leaf was subsequently picked as the Air Combat Command's research fellow in the command-sponsored research program. After graduation as the Air War College recipient of the Secretary of the Air Force Leadership Award, Colonel Leaf reported to Langley AFB, Virginia, as the Deputy Commander of the 1st Operations Group, 1st Fighter Wing where he is currently the commander.

Colonel Leaf is a command pilot with more than 3,000 flying hours. He is married to the former Yu-Chu Chen of Taichung, Taiwan, Republic of China. They have a son, Tom, an infantryman in the United States Army, and a daughter, Ya-Ting.

Acknowledgments

I had the easy job; I just had to write this thing. Many people had the more difficult job of reading it, and offering advice and constructive criticism. My research advisor, Dr Buck Grinter, gave me plenty of rope but kept me from hanging myself. Dr Glenn Morton was a kind and patient editor--one who would write, "just a few red marks," when he had gone through a forest of editor's pencils. Many on the Air War College faculty provided support as well. Dr Dan Hughes was an inspirational instructor; I think he may have been Clausewitz in his last life. He offered several key suggestions on research paths and some of the specifics of this study. My AWC seminar directors, Cols Larry Carter, John Mollison, and Joe Czarkowski were extremely supportive, and Colonel Carter fed me approximately one source document per week. Col Jim Brechwald, the Combat Air Forces Chair, also provided support for the study and several initiatives to improve the command-sponsored research (CSR) program.

Col Bob Johnston brought tremendous energy and intellect to the Airpower Research Institute, much to the benefit of the CSR fellows. His efforts on our behalf improved quality of life, productivity, and professional viability. The other research fellows, in particular Lt Col Kevin Smith, provided great mutual support. Lt Col Mike Starry offered great advice and an extremely articulate Army viewpoint. Many others helped, including Melrose Bryant of the Air University Library; Capt Kim Rich with a superb eye for bad grammar and flawed logic; Maj Ted ("K-Mart") Kresge of ACC/ALFA with a clear understanding of the problem; and too many others to mention.

Major General Hurley, my boss for this project, gave me a great initial vector and let my velocity carry me where it might. He offered occasional course corrections, and outstanding moral support. He made the entire Air Combat Command plans and programs staff available for my inquiries, and that proved absolutely invaluable.

To all, my sincere thanks. I hope the end product proves worthy of our efforts.

Chapter 1

Defining The Problem

"Fox I leader at 18 thousand from Nickel 1." As the AIM-7 radar missile streaked at the unseen enemy, Nickel 1 cranked his F-15C into a hard turn down and to the left. "Nickel 2's clean." "Dammit," the leader muttered to himself, "his radar work is better than that, Two should have a radar contact by now." The life-and-death game of chicken continued, closing from 18 nautical miles to inside 12. Startled by a tone in his headset, the flight lead glanced at the radar warning display to see that a MiG-29 had locked him up with his on board radar. Nickel 1 was well inside the MiG's WEZ (weapons employment zone). "And he's probably fired," he thought. A quick switch action dispensed chaff. Adding to his consternation, the F-15 pilot had lost sight of his wingman, and there was now a cloud deck between his jet and the adversary. Will his missile destroy the bandit? Has the adversary fired? He hates it when this happens. Suddenly, a blinding flash! The fighter pilot is jarred from his daydream as the lights come up at the end of the lecture, and he rises to applaud the Air War College speaker.

This opening anecdote serves two purposes. First, it may be the most exciting reading in this study. Second, it should provide a frame of reference for Air Force readers. This study examines unity of command as it relates to deep battle and air interdiction. The Army's interest there is often thought by Air Force officers to be selfish and budget-oriented. All blue-suit readers need to remember that enemy artillery is a key target set in this area. The division commander concerned about the deep battle does not simply want a larger piece of the battlefield to play with. He wants to avoid bringing his troops into the enemy's WEZ without having done something to negate that artillery threat. His reluctance to trust that job to another service, or his superior unit, is understandable. He does not want to be in a situation similar to the F-15 flight lead described above.

The issue of interdiction and deep battle management most recently came to a head in Desert Storm. Mention the Gulf War, and one conjures visions of bombs down air shafts, an enemy air force running for its life, and Iraqi soldiers surrendering in droves after days and nights of ceaseless air attack. Gen Colin L. Powell, chairman of the Joint Chiefs of Staff, noted that "air power was decisive in that war. It made the rest of what we had to do that much easier."¹ With remarkable results and a rave review from the boss, one might think that the Army and Air Force had buried all their long-standing bones of contention. Far from it, the two services are wrangling over how to synchronize interdiction and deep battle combat power.

Why is synchronization important? A November 1992 statement from the Joint Chiefs says it this way:

Synchronizing interdiction and maneuver (both land and sea) provides one of the most dynamic concepts available to the joint force. Interdiction and maneuver should not be considered separate operations against a common enemy, but rather complementary operations designed to achieve the joint force commander's campaign objectives.

Potential responses to synchronized maneuver and interdiction can create an agonizing dilemma for the enemy. If the enemy attempts to counter the maneuver, enemy forces can be exposed to unacceptable losses from interdiction; if the enemy employs measures to reduce such interdiction losses, enemy forces may not be able to counter the interdiction and maneuver assists commanders in optimizing leverage at the operational level.²

Two key concerns spurred the current dispute surrounding synchronization. The first is the responsiveness of air interdiction to land force requirements, and the second is the joint force air component commander (JFACC) concept. Those issues suggest three possible methods of study. The first is a simple analysis of interdiction procedures. Combining that approach with a detailed examination of the JFACC concept is a second approach. The final option, and the one chosen for this study, is a further hybrid. This includes a reasonably detailed examination of the evolution of interdiction and related issues, and of current issues regarding the JFACC.

As readers wade through the chapters 2 through 4, they may wonder, "Why all the history?" The historical examination seeks positive and negative conclusions about previous applications of air interdiction, and about the development of deep battle. Without that background, drawing hasty conclusions is too great a risk. Whatever recommendations come in chapter 6, they should build on things the US armed forces have done right, while avoiding previous errors.

The Disagreement

Imagine that it is February 1990, and you are Lt Gen Frederick M. Franks, US Army. Within days you will send your VII Corps soldiers into the largest battle US troops have fought in nearly 30 years. You know that there are targets beyond the front lines you want struck, and struck by Air Force fighters. You and your staff nominate those targets, but only 15 percent³ of them are attacked by USAF forces (as far as you know). Happy? Probably not.

General Franks wanted those targets attacked as part of the Air Force interdiction effort. Holding the traditional view that tactical air assets primarily exist to serve land forces, Army commanders felt they were unable to "shape the battlefield" with USAF sorties. When that failed, coordination measures prevented them from accomplishing the task with their own missiles or artillery. In the aftermath of Desert Storm, the Army recommended changes to the Air Force air tasking order (ATO) and airspace control measures to give them more flexibility.⁴

Air Force leaders, conversely, believe Desert Storm validated long-standing Air Force doctrinal concepts, particularly that of the Joint Force Air Component Commander. They believe the JFACC should be the single manager for all fires beyond the fire support coordination line (FSCL) to ensure centralized control and decentralized execution. This view is in direct disagreement with the Army's.⁵

Considering the recent emphasis on joint (multiservice) operations, this controversy may seem even more surprising. The services have published a general warfighting document emphasizing the need for interservice cooperation.⁶ The Department of Defense (DOD) is working on more joint doctrine and better cooperation, but has not eliminated major disagreements. Despite the "Joint Warfare is Team Warfare" philosophy, there are still some very basic issues to resolve.

It is important, early in the study, to acknowledge that the two services can have differing opinions and both be right. That predictable outcome of differing perspectives is often overlooked, as if service beliefs were zero-sum and for one to be right, the other must be wrong. Consider the story of the Air Force forward air controller (FAC) in Korea in the late 1970s.

Army officers *never* drive their own administrative vehicles; to do so would be like using bad language in front of one's mother. It just isn't done. Fighter pilots, on the other hand, seldom relinquish the controls to anyone. A fighter pilot FAC, a captain, drove up to a cantonment gate and was greeted by a brigade commander (colonel) checking seat belt use. He didn't think he had a problem. After all, his belt was securely fastened. Imagine his surprise when the colonel snarled, "Captain, I can't believe how much the Air Force pays its jeep drivers!" The FAC thought for a minute, and replied, "Colonel, it isn't half as much as the Army pays its gate guards!" In a way, they were both right, from their differing perspectives.

This chapter lays the foundation for a detailed investigation of how best to synchronize *interdiction* and deep battle operations. It defines the specific research question, and explains the methodology of this study.

Other Relevant Issues

In addition, several other issues have direct bearing on deep battle and air interdiction synchronization. These include the quest for a separate air force in the 1930s, the Army Air Forces' preoccupation with strategic bombing, and the validity of Army deep battle concepts. The overarching question, however, is whether air power's primary role is the support of the land forces.

The last issue merits consideration at the outset. Exactly what is the relationship between ground and air forces? Is one subordinate to the other? If air forces can support ground operations, is there any reason why land force operations cannot support air operations? After Desert Storm, many spoke and wrote of the potentially decisive role of air power in the war.

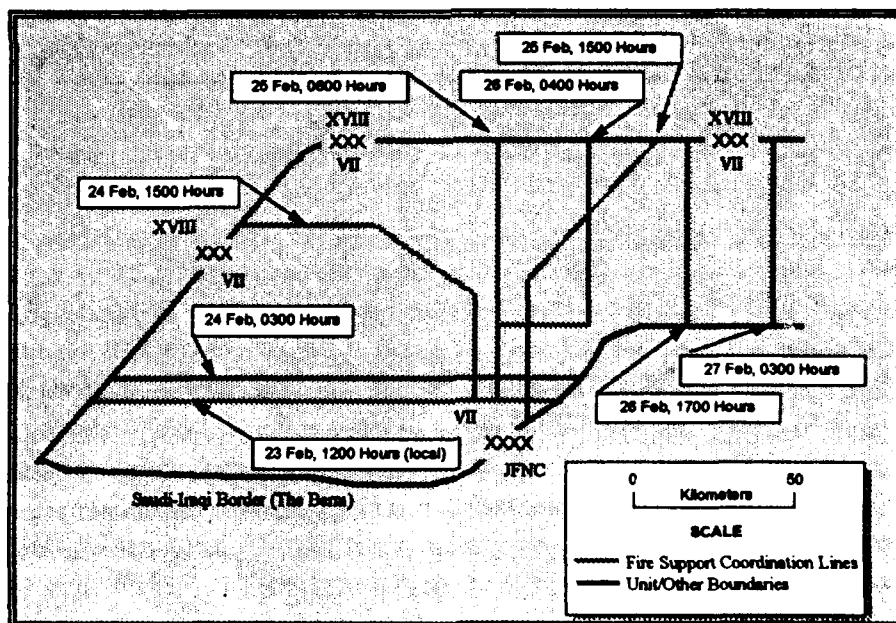
This was not the first instance where combat experience inspired such debate. In 1943, the publication of Field Manual (FM) 100-20 *Command and Employment of Air Power* could have put that issue to rest. A War Department (not Department of the Army or Army Air Forces) publication, FM 100-20 stated unequivocally:

Land Power And Air Power Are Co-Equal And Interdependent Forces: Neither Is An Auxiliary Of The Other.⁷

For a variety of reasons, *Command and Employment of Air Power* did not end debate on the topic. Foremost, much more effort is expended in the writing of doctrine than the reading of it. Experience in limited wars, with political constraints, drove the Air Force away from its own fundamental beliefs. The nuclear focus of the period between limited wars put land and air cooperation on the back burner. Finally, competition for budget dollars naturally drives the armed services to assert their own unique preeminence.

The 1986 Goldwater-Nichols Department of Defense Reorganization Act requires a periodic review of service roles and missions by the chairman, Joint Chiefs of Staff. The chairman is to seek opportunities to eliminate redundancies and maximize effectiveness.⁸ The resulting 1993 report and political pressure make it clear the smaller U.S. military will have to be efficient in manpower, equipment, and procedures. As a predominantly expeditionary force, DOD elements can expect to operate in overseas locations as a joint (or perhaps combined) command without a preexistent command and control infrastructure. The armed forces cannot afford a bloated command and control structure to synchronize complementary warfighting capabilities.

The difficulties are not limited to the conceptual or philosophical. Fog and friction can make coordinating elements of a single service and type nearly impossible. Establishing an effective link between two services, organized and equipped differently, is an even greater challenge.



Source: Zook, 169.

Figure 1-1. VIIth Corps Desert Storm FSCLs.

Interdiction and deep operations must be synchronized to avoid hitting friendly troops with air or surface weapons while hitting the best enemy targets. Figure 1-1 illustrates the geographic area where they overlap. The fire support coordination line (FSCL) is a permissive fire control measure beyond which components can attack surface targets without coordinating with the ground commander. The appropriate ground commander establishes the FSCL, and it should follow well-defined terrain features.⁹

Commanders adjust the FSCL as an operation progresses. The illustration shows how the FSCL in General Franks' area moved during the ground phase of Desert Storm. Chapter 5 examines FSCLs in detail, and readers may want to refer to figure 1-1 to help visualize FSCL application.

During planning, much of the overlap occurs during targeting. The Army refers to the targeting process as "Detect, Decide, and Deliver" functions.¹⁰ Where the operations overlap, key decisions are meshing target lists, prioritization of targets, and selection of attack methodology.

The attack phase requires synchronization to protect friendly forces. Measures to accomplish that synchronization can impede tactical flexibility for both land and air forces. The control methodology, in the Army's view, has not kept pace with growth in their ability to look, maneuver, and fire into the deep operations area. Specifically, Army commanders did not believe they had the flexibility to employ weapons beyond the FSCL in a timely manner.

Army commanders traditionally believe they must command everything in their area of responsibility (AOR) to ensure their unity of effort.¹¹ Deep battle doctrine and long range attack assets like the Army tactical missile system (ATACMS) and attack helicopters extend their AOR to depths previously thought of as an Air Force-only target domain. This extension clouds the distinction between air and land operations and has led to heated disagreement between the two services over targeting. The emergence of the air campaign concept has heightened that difference of opinion.

Furthermore, land component commanders and their subordinate tactical commanders maintain a vested interest in the impact of air power on their schemes of fire and maneuver. Their interest is direct in the close-in battle, as represented by air component close air support. In a less direct role, ground bosses feel they must have real-time access to the air interdiction effort through the targeting process.

In this study, *synchronization* refers to organizational structures, processes, and methods that allow the assets of two military services to operate in the same geographic area at or near the same time. Air Force doctrine notes that, "Interoperability should be a major consideration in equipment mix and structure decisions. Effective joint and combined operations require functional and technical interoperability among the military branches and allies."¹² Air interdiction and deep battle operations overlap to such a great degree that synchronizing the two is difficult, contentious, and critical.

Research Question and Methodology

The research question is, "*How should air interdiction and land component deep operations be synchronized?*" The answer to that question, within the framework of some reasonable limitations, should give military planners a road map for future decisions in this area. The issue touches many areas, including philosophy, doctrine, organization, targeting procedures, and control measures.

Methodology

The study answers the following questions:

1. How has US Air Force air interdiction evolved?
2. What are current US Air Force air interdiction capabilities and requirements?
3. How have US Army deep operations evolved?
4. What are current US Army deep operations capabilities and requirements?
5. What structures and processes currently accomplish necessary synchronization of deep operations and air interdiction?
6. What are the current issues and impediments applicable to that synchronization?

Chapters 2 through 4 cover the development of both interdiction and deep battle, associated doctrine, related philosophical issues, and the lessons of combat. Chapter 5 examines the current state of affairs in the topic, and current initiatives to modify those elements. The final chapter presents conclusions and recommendations. The recommendations include suggested strategies for implementation and appropriate supporting tasks.

Assumptions

A meaningful study must begin with some basic assumptions. The first is that the joint force air component commander concept envisioned by the Air Force is valid, and will be used to some degree in future contingencies. The study does not, however, assume that the JFACC should control all fires beyond the fire support coordination line; rather, that will be a key part of analysis.

The Army's vested interest in air interdiction is also central to the discussion. Is that interest is so great that Army commanders must play an *active* role in interdiction targeting and execution? Similarly, does the air component need a vote in land component deep battle assets to support air operations?

Limitations

This study is unclassified and only addresses other Air Force mission areas if they are relevant to the research question. Other critical aspects of joint warfare, such as special operations forces, are also addressed only as specifically necessary. For clarity, this research considers only US Army and US Air Force operations. Naval force and Marine operations are important elements of joint warfare and interdiction, but the Army and the Air Force are the primary antagonists.

The historical overview of interdiction begins with World War I, but the discussion of deep operations starts with the post-Vietnam War period. At that time, the Army began to look seriously beyond the forward edge of the battle area. The background will support reasonable conclusions about the evolution of Army and Air Force operations.

This study is not a detailed examination of Desert Storm, nor is it a nuts-and-bolts treatise on the tactical air control system. It will not enable the reader to build an air tasking order in his basement, or to call for supporting artillery fire. The paper has a generalist focus and should help readers with any perspective understand how the controversy developed and recognize the most reasonable solutions to related problems.

Terminology

The paper uses standard terminology from Joint Pub 1-02, *DOD Dictionary of Military and Associated Terms*, with limited the use of abbreviations. For all terms, readers should apply the construct described: Joint US forces, with an Army joint force commander (JFC) and land commander (JFLCC), and an Air Force JFACC. That will not always be the case, but the scenario provides a valid framework for the study.

The definition of interdiction is obviously central to the study. The current Air Force Manual (AFM) 1-1 definition of air interdiction is appropriate regardless of era, service, or weapon. This version of the manual differentiates missions as aerospace control, force application, force enhancement, and force support. Interdiction falls in the force application realm as a mission that applies aerospace power directly against enemy land targets.¹³ The specific definition is very concise:

Interdiction delays, disrupts, diverts, or destroys an enemy's military potential before it can be brought to bear against friendly forces.¹⁴

During the different eras, mission names may have varied but the overview includes missions that can reasonably fit into the above definition of air interdiction. Lately, interdiction has taken on a broader context:

Interdiction diverts, disrupts, delays, or destroys the enemy's surface or subsurface military potential before it can be used effectively against friendly forces. Interdiction capable forces include fighter or attack aircraft and bombers; ships and submarines; conventional airborne, air assault, or other ground maneuver forces; special operations forces; surface-to-surface, subsurface-to-surface, and air-to-surface missiles, rockets,

munitions, and mines; artillery and naval gunfire; attack helicopters; electronic warfare systems; antisatellite weapons; and space-based satellite systems or sensors. Interdiction is a powerful tool for the joint force Commander. *The JFACC is the supported commander for the Joint Force Commander's overall air interdiction efforts.*¹⁵ (Italics added.)

As the study moves into the post-Desert Storm debate, that definition becomes the basis for discussion. However, the final sentence citing the JFACC as the supported commander for interdiction ensures the concepts addressed throughout the paper will remain relevant.

Notes

- ¹ "A New Military Hallmark," *Air Force Policy Letter for Commanders*, October 1992, 4.
- ² Joint Chiefs of Staff, *A Doctrinal Statement of Selected Joint Operational Concepts*, (Washington, D.C.: Government Printing Office 23 November 1992), 15.
- ³ Lt Col Richard B.H. Lewis, *DESERT STORM--JFACC Problems Associated With Battlefield Preparation* (Carlisle Barracks, Penn.: U.S. Army War College, 15 April 1993), 29.
- ⁴ U.S. Army Concepts and Analysis Command, *Desert Shield/Desert Storm After Action Executive Summary*, 27 September 1991, 6.
- ⁵ Training And Doctrine Command, *Full Dimensional Operations Briefing*, August 1992; US Air Force Deputy Chief of Staff for Plans and Operations, *JFACC Primer* (Department of the Air Force: Washington, D.C., 1 August 1992), 21-22.
- ⁶ Joint Pub 1, *Joint Warfare of the U.S. Armed Forces* (Washington, D.C.: Department of Defense, 1991).
- ⁷ War Department, FM 100-20, *Command and Employment of Air Power* (Washington, D.C.: Government Printing Office, 21 July 1943), 1.
- ⁸ Gen Colin L. Powell, *Roles, Missions, and Functions of the Armed Forces of the United States*, (Washington, D.C.: Department of Defense, February 1993), v.
- ⁹ Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington, D.C.: Department of Defense, 1989), 144.
- ¹⁰ Field Manual (FM) 100-15, 6-20.
- ¹¹ Maj Ted Kresge, ACC/TRADOC ALFA, interview with author, 15 July 92, and author's personal experience as a forward air controller, air liaison officer, and faculty member at the U.S. Army Command & General Staff College.
- ¹² AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force*, vol. I, March 1992, 19.
- ¹³ AFM 1-1, vol. I (March 1992), 6-7.
- ¹⁴ *Ibid.*, 6.
- ¹⁵ *A Doctrinal Statement of Selected Joint Operational Concepts*, 14-1.

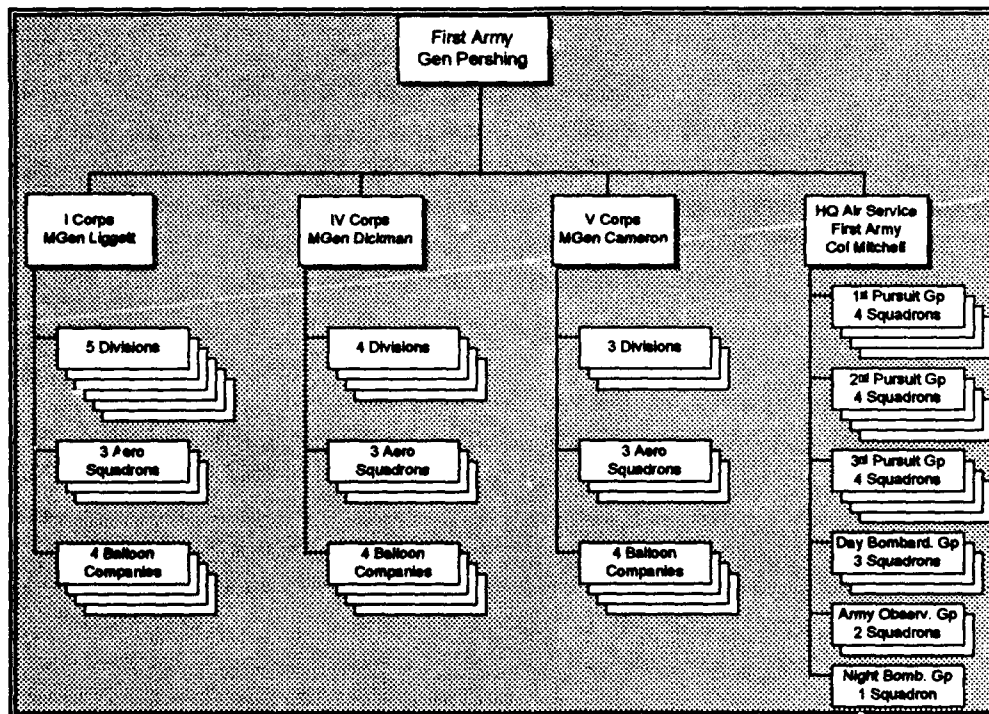
Chapter 2

Interdiction In The World Wars

This chapter examines US Air Force air interdiction capabilities, limitations and procedures in a historical survey from Col William ("Billy") Mitchell's efforts in World War I through World War II. It traces the evolution of doctrine, targeting, command and control, aircraft, and weapons in chronological rather than topical fashion to correlate the many factors influencing the evolution of US Air Force interdiction.

World War I

Many studies begin their discussion of air interdiction in the early days of World War II. However, World War I provided valuable examples of tactical air missions and an American interdiction effort. The Army Air Service participated in a single major campaign, support of the Saint-Mihiel and Argonne Meuse offenses in the autumn of 1918. Colonel Mitchell commanded this combined American, British, and French effort of nearly 1,500 aircraft.¹ Figure 2-1 is a simplified diagram of the command structure, showing only American units under Mitchell's direction. This diagram illustrates both the size and complexity of this early air campaign.



Source: *The U.S. Air Service in World War I*, vol. 3.

Figure 2-1. US Air Service Units, September 1918

Command and Control

The American Air Service was organized and equipped specifically to support land force action. Because the British Royal Flying Corps (RFC) operated independently, receiving orders from an air ministry rather than land commanders, US bombers were not allowed to integrate with RFC aircraft.² The aero squadrons and balloon units were allocated as low as division level, but Colonel Mitchell's leadership as Chief of Air Service, 1st Army, influenced training and combat operations of all the aviation units. Group commanders retained tactical flexibility to cover orders or instructions of their associated ground unit.³ While not exactly centralized control and decentralized execution, this structure allowed a coordinated air effort encompassing all the existing air missions.

Air interdiction did not exist as a World War I mission category. Air combat missions included pursuit, observation, strategical bombardment, and tactical bombardment. Tactical bombardment missions struck targets within 25,000 yards of friendly troops' front lines. These missions were most like the current definition of close air support. Mitchell defined strategical aviation as focused on destroying an enemy supply capability to prevent the opposing army from being completely effective in combat. Attacks on enemy planes, supply caches, production facilities, and lines of communication were to achieve that end. That definition resembles the current description of air interdiction.⁴

Battle Order #1 clearly stated the Air Service objective against the St. Mihiel salient,

TAKE THE OFFENSIVE AT ALL POINTS WITH THE OBJECT OF DESTROYING
THE ENEMY'S AIR SERVICE, ATTACKING HIS TROOPS ON THE GROUND
AND PROTECTING OUR OWN AIR AND GROUND TROOPS.⁵

Mitchell used pursuit and day bombardment units to accomplish this offensive. Air combat and bombardment were closely linked, and required close liaison between pursuit and bombardment units. Bombardment had two objectives, one closely resembling current interdiction concepts, "To destroy and harass the rear areas of the battlefield, and to attack military and industrial objectives beyond the range of artillery."⁶

Bombardment missions in support of the St. Mihiel offense usually hit targets of opportunity discovered during armed reconnaissance. The targets included rail yards, troops, wagons, and even stockpiles of hay.⁷ These missions are characteristic of the first of three general types of interdiction targeting found throughout this study:

1. Armed reconnaissance and targets of opportunity, specified by category of target and general location before sortie launch, but not by precise target.
2. Campaign targets, specifically targeted prior to execution of an interdiction effort, targeted before launch.
3. Developed targets, identified and targeted during an interdiction effort, targeted before launch.

A later memorandum described tactical bombardment missions and the value of air attack during exploitation:

The squadrons move forward to the new advanced fields which were previously prepared, extend their zone of action and execute the same mission as the days before. However, as a retreating army is in open ground, the airplanes will operate as low as possible in order to seek the obligatory points of passage of the enemy's columns and to destroy them with bombs and machine guns at such places.⁸

Pursuit aircraft were not limited to air-to-air combat, they joined bombardment aircraft to attack surface targets with 20 pound bombs and strafing attacks.⁹ In the Air Service's brief bombing effort, US squadrons dropped over 13 tons of bombs in 150 bombing raids.¹⁰ Unit histories portray several consistent lessons learned. Air superiority (described as the absence of enemy machines) was key to effective interdiction. Armed reconnaissance located targets and attacked them immediately, especially during exploitation. The histories spoke expansively of glorious air-to-air combat, and many missions resulting in aerial victories included strafing attacks on ground forces. Air Service squadrons were aligned with ground units, and sometimes directed by ground commanders, but Colonel Mitchell maintained control as chief, Air Service, First Army.¹¹

Aircraft and Weapons

The Americans flew simple biplanes with limited bombloads and low-caliber machine-guns in World War I air combat. The US-built DH-4 bombers carried up to 600 pounds of bombs and 30-caliber guns pointed both fore and aft. French-built Breguets carried a greater payload, or could operate above 10,000 feet easily with a similar 600-pound bomb load. Rudimentary aiming techniques limited their bombing accuracy. Dropping from relatively high altitudes, the observer in the rear cockpit acted as a bombardier, directing course adjustments by pulling on a rein attached to either of the pilot's shoulders.¹² Pursuit Spads, Neueports, and Sopwith Camels carried lighter loads of 20-pound bombs and a variety of guns, also near 30-caliber.¹³

Between the World Wars

American leaders perceived four major lessons about the characteristics of air power. They viewed it as fundamentally offensive in nature. The relative speed and range of aircraft gave air power a unique flexibility. These leaders believed that air power had changed the nature of war and, finally, that air power was "unstoppable."¹⁴ Valid or not, those lessons were widely held and influenced other issues. The other hot topics after the war included autonomy for the Air Service, mission priorities, and tactical doctrine.

Wrangling over control of aviation assets overshadowed all other issues. Air Service officers sought a separate and independent air force along the British model, but they failed in that effort. The Mitchell furor over naval vulnerability to air attack heightened differences between the branches. The result was the antithesis of centralized control of air assets. After a 1 March 1935 reorganization, tactical aviation units were parceled out among nine corps areas.¹⁵

This arrangement later ensured failure in North Africa during the early days of World War II. Air power employment doctrine and theory also evolved between the wars. Specific lessons from World War I did not carry as much weight as the theories of a new brand of thinkers who espoused the merits of strategic bombing. Giulio Douhet's *Command of the Air* was perhaps the most influential, and it promulgated the myth of victory through strategic bombing alone. Even General Mitchell saw the ability to "go straight for the vital centers" of an enemy nation as a chief advantage of air power. The focus of Army Air Forces' prewar planning became strategic bombing.¹⁶

Air War Planning Document-1 (AWPD-1), "Munitions Requirements of the Army Air Force," completed in August of 1941, reflected the perceived power of strategic bombing and the fundamentally offensive nature of air power. Although Mitchell had demonstrated the tactical applicability of air in France, and the British had done so in Greece, AWPD-1 saw strategic bombing as the primary manifestation of offensive air power. Indeed the procurement specified in that document showed strategic bombing as the only offensive role for aircraft.¹⁷

AWPD-1 was a guide for mobilization and not doctrine, but it did represent the most widely held beliefs on the subject. The authors envisioned an air arm with 3,740 strategic bombers with a 4,000 mile range. These bombers would have to defend themselves, as the Army Air Forces suggested procuring only 13 experimental escort fighters. Indeed, the plan restricted pursuit aircraft acquisition to keep the limited airfields open to the precious bombers. AWPD suggested it might be possible to defeat Germany by strategic air offensive alone, without land attack.¹⁸

AWPD-1 emphasized the offensive nature of air power, and it reflected hope that the strategic bomber would be revolutionary and unstoppable. However, it was certainly not very flexible. The Army Air Force's status as a subordinate service element did not enhance flexibility, either. Aviation advocates believed creating an independent air force patterned after the British model was the only way to exploit this flexibility. When that proved untenable, they at least hoped for an independent air component within a theater of operations. They were disappointed. Land officers felt the best way to use air power's flexibility was to maintain direct control of a portion of the available tactical air power. That mindset extended to the highest levels. Gen Henry H. ("Hap") Arnold, as a member of the Joint Board (predecessor of the Joint Chiefs of Staff), found he had a speaking part only when air power was specifically addressed. Otherwise, he was expected to be seen and not heard.¹⁹

Not all Air Service officers saw strategic bombing as the primary mission of air power. At the Air Service Field Officers School, Maj William Sherman wrote a text on air tactics that addressed air superiority and air interdiction. In his view, control of the air was of first importance, and the next goal was "to destroy the most important enemy *forces* (italics added) on the surface of the land or sea," as opposed to General Mitchell's "vital centers." His ideas eventually became an Air Service Training Regulation, *Fundamental Principles for the Employment of the Air Service*.²⁰ The Air Service's focus remained strategic bombing, however, and other forms of air warfare were largely ignored.

World War II

Without much valid tactical doctrine entering the war, the Army Air Forces developed some doctrine quickly in the heat of battle. The first major land battle involving US ground forces also provided the disproving ground for the existing methods for employing tactical air power. A stunning defeat at Kasserine Pass in Tunisia left an indelible imprint on American air power tactics, doctrine, and thinking.

North Africa

The difficult lessons learned in North Africa from November 1942 to May 1943 best represent the effect of the prewar doctrinal evolution on interdiction. Tactical air forces were organized subordinate to ground units just as the Air Force was subordinate to the Army. The prewar assumptions did not withstand the test of combat.

Allied forces landed in Northwest Africa on 8 November organized as three task forces totaling more than 100,000 men. They faced an approximately equal French land force, supported by about 350 aircraft (not including those on Sicily available for action). Military action and a change of heart by the leader of the Vichy French combined to end French resistance by 11 November 1942.²¹

The Germans rebounded from their initial disadvantage and rushed reinforcements to Tunis by air. They began the operation on 9 November 1942, the same day the Allies recognized that defeating the Nazis in Tunisia would take longer than expected. That realization led to cancellation of a combined airborne and commando assault to the east. Hopes for a quick victory faded, and the Allies faced an advance over 400 miles against stiff German resistance.²²

Lack of surprise was not the only Allied shortfall. The Luftwaffe maintained superiority over the Tunisian battlefield with aircraft based near Tunis and in Sicily. That air superiority proved crucial during the battles of November and December 1942.²³ Persistent Luftwaffe fighter-bomber harassment damaged American morale and impeded movement. It also fostered a very negative opinion of air support, leaving Gen Dwight D. Eisenhower wondering, "Where is this bloody Air Force of ours?"²⁴

Allied air forces lacked theater operating bases with hard-surfaced runways, but they carried out an extensive program of airfield construction. Unfortunately, they did not have doctrine or organizational structure that would put the aircraft to good use.²⁵ Still, Allied attacks on German airfields disrupted resupply efforts enough to delay German reattacks.²⁶

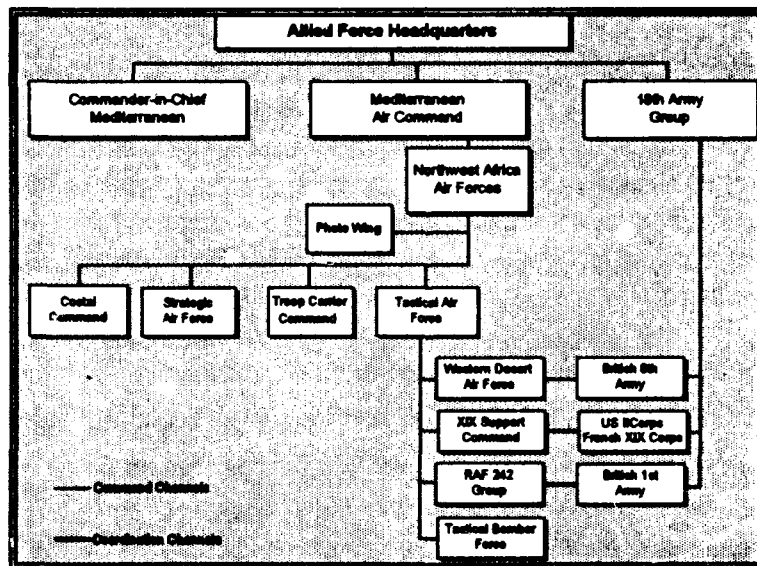
Rommel's army, retreating westward from Libya ahead of Gen Bernard L. Montgomery's Eighth Army, joined with the Axis forces in Tunisia and launched an offensive that pierced the American lines at Kasserine Pass. The American forces suffered casualties that put entire battalions out of commission, and they were unable to muster

effective air support of their own. When they did get air support, their own ground forces often turned them away with antiaircraft fire, damaging several airplanes beyond repair.²⁷

This defeat was momentarily threatening, but not decisive in terms of the campaign.²⁸ Even so, the American failure at the Kasserine was a catalyst for immediate change in air support coordination.²⁹ The primary purpose of the reorganization was to facilitate air superiority. In addition, the centralized control improved the prospects for an effective air interdiction campaign. It was fitting that Gen Laurence S. Kuter, one of the authors of AWPB-1, found himself involved in tactical aviation once the war started. Of the command arrangements that existed until the Casablanca conference, he said:

In accordance with War Department general staff doctrine, which was unsound, air units were parceled out among the ground forces, and so scattered that their inherent flexibility and mobility were lost.³⁰

The reorganization ended the practice of parceling out bits of air power to maneuver unit commanders. A joint (actually combined, or multinational) command took control of all Allied air forces in late February of 1943. The Northwest Africa Tactical Air Force under RAF Vice Air Marshal Sir Arthur Coningham provided the necessary centralized control and facilitated decentralized execution. This structure was not intended to divorce land and air operations, rather to retain strong coordination without shackling air units to the ground forces.³¹



Source: *Air Power in Three Wars*, 41-43.

Figure 2-2. Command Arrangements after Casablanca

Roosevelt and Churchill approved these changes in command relationships on 26 January 1943 at the Casablanca conference. They were implemented immediately after the

Kasserine defeat.³² Figure 2-2 details the reorganization. Rather than being superior-to-subordinate associations, the air units aligned with ground components for *coordination* purposes. In that manner, they could retain their link to the ground commander while being responsive to the centralized control of an air component commander.

The reorganization ended umbrella tactics in favor of offensive air operations.³³ The resulting Northwest African Air Forces thrived in March and April, finally achieving air superiority and working with Allied naval forces to interdict enemy supply routes from Italy. The supply flow (air and sea) dropped by one-third from January to April of 1943. On 6 May, the Northwest African Tactical Air Force flew more than 2,000 sorties ahead of an allied surface attack and contributed to a rout. The Allies captured Tunis and Bizerte on 7 May, and the victory was complete by 13 May. Six hundred unserviceable enemy aircraft were among the significant findings after the victory. They were still in-theater, lying damaged and dormant on previously enemy airfields.³⁴

FM 100-20

The publication of FM 100-20, *Command and Employment of Air Power* (1943) chiseled the North Africa experience in doctrinal stone. *Command and Employment of Air Power* is perhaps the key document in the development of U.S. Air Force tactical doctrine. The basic ideas in FM 100-20 are the foundation for the current AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force* and of the JFACC concept.³⁵

Much of *Command and Employment of Air Power* addressed the relationship between air and land forces. The pamphlet discussed the role of air power in relation to land and sea power, as well as fundamental priorities of aerial warfare. The volume called air and land forces "co-equal and independent," a view many combat air force officers have held to be self-evident. Similarly, the other basic tenets of 100-20 would hardly strike an Air Force reader as radical. *Command and Employment of Air Power* referred to "the inherent flexibility of air power" as its greatest asset, addressed the primacy of air superiority, and covers the organization of theater air forces.³⁶

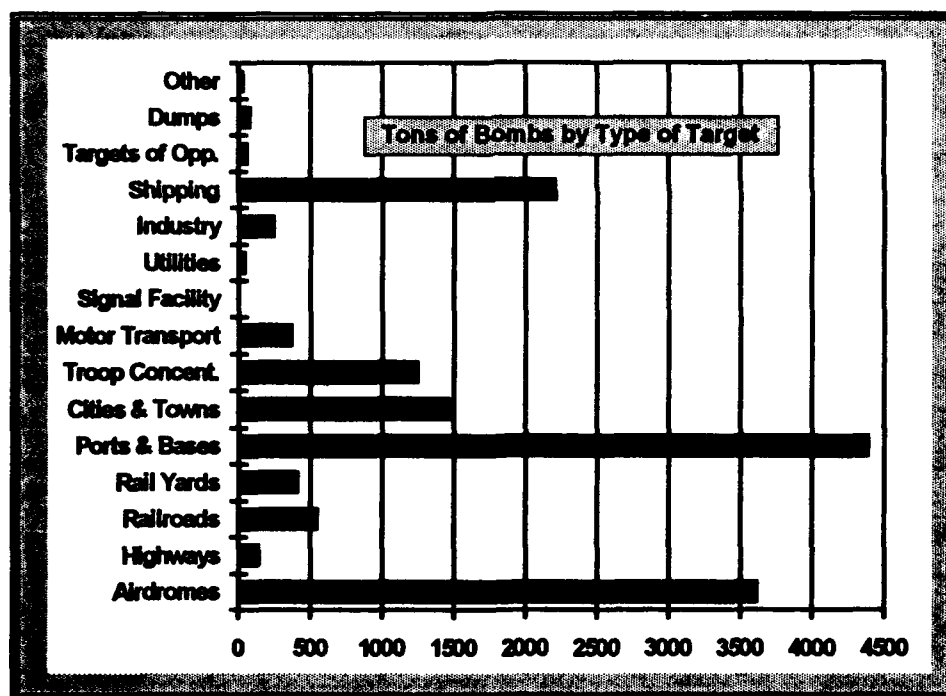
Command and Employment of Air Power included these basic arguments:³⁷

1. Land power and air power are co-equal and interdependent.
2. The gaining of air superiority is the first requirement for the success of any major land operation.
3. Control of available air power must be centralized and command must be exercised through the air force commander if this inherent flexibility and ability to deliver a decisive blow are to be fully exploited.
4. The superior commander will not attach army air forces to units of the ground forces under his command except when such ground force units are operating independently or are isolated by a distance or lack of communication.

5. *Command and Employment of Air Power's* boldest pronouncement, that air power has the potential to be decisive. "...SUCH CONCENTRATION (of air power) IS A BATTLE WINNING FACTOR OF THE FIRST IMPORTANCE."

FM 100-20 did not define air interdiction as such. Instead, the authors describe three phases of air operations in order of priority. The first phase placed priority on achieving air superiority. Once achieved, effort was to turn to preventing enemy forces and provisions from moving into or within a theater of operations. Optimistically termed the "isolation of the battlefield," such disruption could include signal lines of communication, logistics bases, and marshaled forces. In theory, effective interdiction like this would cause an enemy to retire, and during the third phase, well-timed air exploitation would turn the "retirement into a rout."³⁸

Despite the FM 100-20's precise wording, one basic problem still existed regarding interdiction. What exactly are interdiction targets as opposed to strategic bombing and close air support? The doctrinal definitions notwithstanding, historical records are unclear and contradictory when detailing mission targets. Figure 2-3 shows how Twelfth AF recorded their efforts in Africa.



Source: *USAF Tactical Operations*.

Figure 2-3. Twelfth AF in North Africa

Sicily

Sicily was the next Allied objective in theater after Tunisia. Operation Husky landed the British Eighth Army and two elements of the Seventh US Army at different places on the island on 10 July 1943, supported by air units of the Northwest African Air Forces (NAAF), primarily the Northwest African Tactical Air Force (NATAF).*

The three main elements of the air effort order of priority were counterair, interdiction, and close air support. NAAF pilots and crews conducted preparatory attacks between 15 June and 9 July 1943, attacking enemy airfields and forcing the enemy to withdraw to Italy. The Allies followed up by attacking airfields in Italy and then began to attack communication and transportation facilities. They interdicted resupply across the Strait of Messina, and hit the marshaling yards at Messina. With missions as far north as Naples, the Allies effectively isolated Sicily. D-day sorties continued air interdiction as speed of advance prevented much close air support. Interdiction continued the week after the landings, striking lines of communication, supply depots, and enemy surface defenses. When the Germans were finally forced from Sicily in August, they used darkness and antiaircraft weapons to cover their traverse of the Strait of Messina.³⁹ Air and sea interdiction failed to interrupt this Axis escape. The enemy managed to move more than 100,000 troops, 10,000 vehicles, and 17,000 tons of supplies to Italy,⁴⁰ where they would help force a bitter and costly stalemate.

The Allied invasion of Italy began 3 September 1943 with aspirations of a quick and decisive victory, fortified by secret arrangements for an Italian surrender.⁴¹ High hopes turned quickly to despair. By 28 December, the Allies were stymied at the Gustav line south of Rome. The problem was not a shortage of air power. For example, from 13 to 17 September the Allies were able to average nearly 1,300 sorties per day to only 100 by the Germans. The Luftwaffe sorties were primarily dedicated to interdiction and left their own ground forces open to attack.⁴² The Allies were unable to capitalize on their air advantage with a breakout across the Gustav line. An estimated 45 million pounds of bombs dropped between 1 January and 14 February 1944 failed to achieve decisive results, as did a massive attack on an enemy stronghold at Cassino on 15 March.⁴³

Operation Strangle

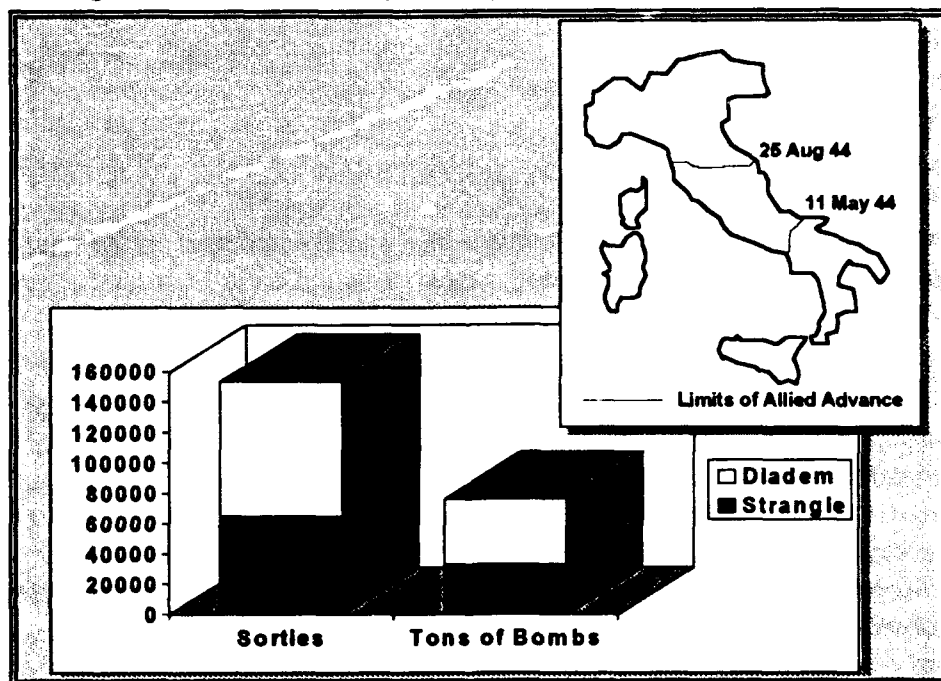
The next major interdiction campaign in the Mediterranean was perhaps the most inappropriately named operation of the entire war. Operation Strangle was a Mediterranean Allied Air Forces (MAAF) effort to end the stalemate in Italy by reducing the German resupply below the minimum for continued combat in the region. This study

*The component designations are often confusing. NATAF was the subordinate tactical element of NAAF, as shown in Figure 2-2. Mediterranean Air Command, 18th Air Army Group, and the Commander-in-Chief, Mediterranean resemble component commands in a modern joint, multinational command structure.

refers to this campaign as Strangle I since the name was resurrected for another interdiction effort in Korea (chap. 3).⁴⁴

MAAF units had attacked German communications in January and February of 1944 in Operation Shingle, but Strangle I was a more concentrated effort with a shift in emphasis. Shingle ended as the MAAF's efforts went to saturation bombing of Cassino against the advice of air commanders. That effort and the following ground assault failed, setting the stage for Strangle I. The effort began 15 March 1944 and continued until 11 May, when the nearly exclusive emphasis on interdiction gave way to a combination of interdiction and close support as part of Diadem. Diadem was not only interdiction, it was a combined air and ground drive for Rome.⁴⁵

As the name implied, MAAF planners intended for Strangle I to isolate the 18 divisions of the German army in central Italy and end a long stalemate. The task of strangulation belonged to the Mediterranean Allied Tactical Air Force (MATAF), which undertook to carry out this mission with some units of the Mediterranean Allied Coastal Air Force. With about 1,700 MATAF aircraft and access to another 2,000 from within MAAF commands, MATAF conducted Strangle I primarily against rail lines of communication. Instead of attacking targets by category, Strangle I planners targeted geographic sections of the railways. This effort reduced German rail transportation and forced the enemy to use vehicle transport and coastal shipping. MAAF attacks were effective enough to limit almost all daytime supply movement.⁴⁶



Source: USAF Tactical Operations (Table 17).

Figure 2-4. Strangle I and Diadem

The results of Strangle I and interdiction as part of Diadem appear impressive. Attacks interdicted every north-south rail line in the area within nine days. Rail cuts rose from 25 per day at the end of March, to 75 in the early stages of Diadem. MAAF attacks reduced daily German transport from more than 80,000 tons to below 4,000 and destroyed over 10,000 motor vehicles. The Germans withdrew 200 miles and lost approximately one-third of their forces in Italy.⁴⁷ What is not so clear is how much of a role Strangle I and Diadem interdiction played in the defeat.

Strangle I interdiction was intended as a supply denial campaign to isolate the enemy from his combat support assets. The Army Air Force found supply denial virtually impossible for many reasons. Bad weather, frugality, and conservation made it possible for the Germans to continue to operate when analysis after the fact showed that countermobility would have been a more realistic and effective focus. Many of the targets would have been the same, and if countermobility had been the goal, attacks could have been scheduled for periods of intense ground combat when the enemy needed mobility the most.⁴⁸

Normandy

Controversy surrounded air support for the Normandy invasion from the outset. There were disagreements between the British and American allies about command relationships and priority of effort. The American emphasis on daylight strategic bombing led senior Army Air Forces leaders to resist efforts to divert heavy (strategic) bombers to support the invasion.⁴⁹ Interestingly enough, Gen Carl A. Spaatz, who had commanded air units in Northwest Africa, was among those leaders, and went so far as to appeal his case directly to Gen "Hap" Arnold in Washington. His appeal was denied.⁵⁰

Much of the air support for the invasion has been categorized as close air support, and it is difficult to distinguish the two in many cases. This discussion addresses the general effectiveness of offensive air support.

Air superiority was key to the final decision to go ahead with Operation Overlord and the effectiveness of the invasion. A concentrated interdiction effort with air superiority had two objectives. The first was to limit Wermacht railway movement by attacking permanent installations and equipment. The second was to confuse and disrupt enemy traffic towards the beach. If not successful, the Germans could have put forces in the battle area more rapidly than the Allies could.⁵¹ The mobility-oriented interdiction campaign forced German reserves to take circuitous routes to the front and prevented any mass reinforcement.⁵² Interdiction was not the only factor in Overlord's success, but it was certainly a key reason the Allies were able to maintain the beachhead and subsequently breakout to begin a race across France.

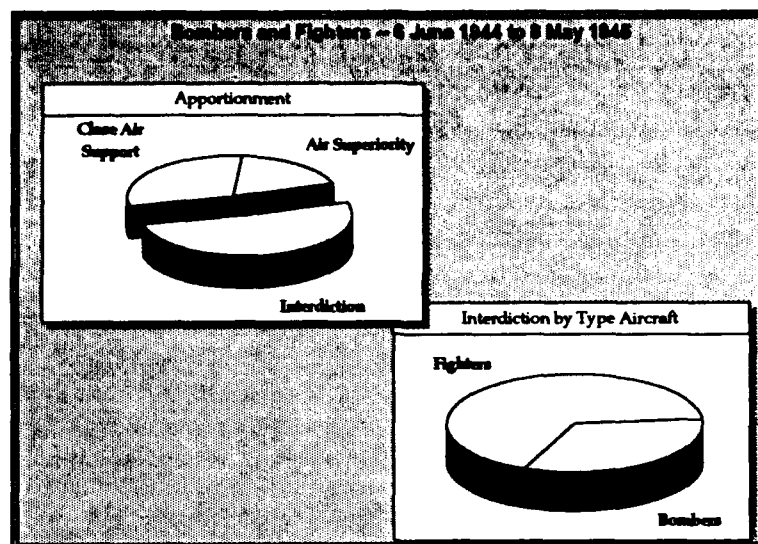
Evidence from the enemy clearly depicts the effectiveness of this interdiction campaign. General Rommel and Field Marshal von Rundstedt disagreed about what type defensive strategy to use against the invasion. Rommel argued that his experience in Northwest Africa showed Allied air superiority would facilitate punishing interdiction. That interdiction would in turn make it impossible to move reserves forward in time or numbers to be useful. Von Rundstedt elected traditional defense in depth to allow him to respond anywhere across the 3000 mile coast.⁵³ Rommel provided an eloquent evaluation on the synergistic effect of air superiority, interdiction, and land attack following the Normandy invasion.

During the day, practically our entire traffic -- on roads, tracks, and in open country -- is pinned down by the powerful fighter-bomber and bomber formations, with the result that the movement of our troops on the battlefield is almost completely paralysed, while the enemy can manoeuvre freely. Every traffic defile in the rear areas is under continual attack, and it is very difficult to get essential supplies of ammunition and petrol up to the troops.⁵⁴

With Patton Across Europe

After an abortive British attempt to breakout from the Normandy beachhead on 1 July 1944,⁵⁵ preparations for American attacks away from the beach began with a massive bombing effort against enemy forces near St. Lô. The US 9th Air Force controlled all tactical air operations, and used a coordination relationship similar to Northwest Africa. IXth and XIXth Tactical Air Commands were aligned with the First and Third US Armies for air support, while the IXth Bombardment Command supported both armies. The Luftwaffe was able to mount only limited opposition from the sky, and was consistently beaten in the air. A German effort to split the two US armies met stiff air attack from IXth, XIXth, and RAF aircraft on 7 August that halted the initial advance and contributed to a German withdrawal on the 13th.⁵⁶

Interdiction preceded another advance as carpet bombings at Caen on 7-8 August allowed UK forces to advance and trap Wermacht forces in and near Falaise-Argentan pocket. Perhaps the most effective use of interdiction was in exploitation as Allied air attacks not only stopped reinforcements, but prevented the escape of the trapped divisions. XIXth TAC maintained its relationship with Patton's Third Army as armored thrusts moved forward to the Seine crossings south of Paris. The flyers completely covered a vulnerable right (southern) flank with close air support and interdiction, although the German forces south of the Loire river were not a very significant threat to Patton's Army.⁵⁷ By 22 November, the Third Army captured the Metz, and a well-coordinated tactical interdiction effort had supported the entire advance. Figure 2-5 shows Ninth Air Force and First Tactical Air Force apportionment and the percentages of interdiction missions flown by fighters and bombers respectively.



Source: *USAF Tactical Operations*, from USSBS.

Figure 2-5. Ninth AF and First TAF Sortie Apportionment

Southern France

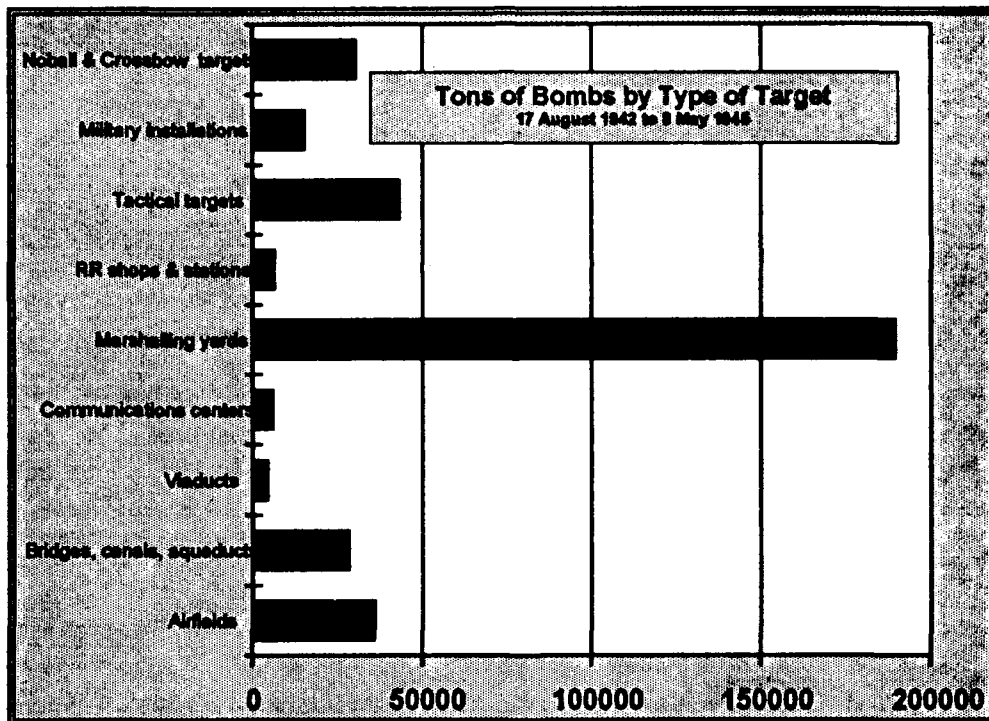
Operation Dragoon replaced plans for Operation Anvil as the planned supporting effort in southern France. The invasion to capture a major port, flank the German forces in western France, and linkup with the Normandy forces for a decisive defeat of the enemy began on 15 August 1944. Supporting attacks began with a 29 April raid on Toulon, and the Mediterranean Allied Air Forces bombed supply lines and disrupted communications. The attacks also supported the Allied offensives in Normandy and northern Italy, with about 25 percent dedicated directly to Dragoon. The preparatory pace quickened on 5 August 1944 with five of the six major railway bridges and rail lines across the Rhone cut in the face of little resistance from the Luftwaffe. The lack of enemy air defense allowed the MAAF to concentrate on interdiction efforts.⁵⁸

The opposition in southern France was not as formidable as it was up north. The MAAF had overwhelming 15-to-1 numerical superiority, but the Germans had well-developed coastal defenses on good defensive terrain. Four days of air attacks dropped almost 7,000 tons of bombs on those defenses while an air attack near Genoa deceived the defenders about the intended landing area.⁵⁹

During the advance north after the invasion, XIIth TAC took advantage of complete air superiority to maul the retreating Wehrmacht. Luftwaffe resistance was so light that MAAF downed only 10 enemy aircraft in the month after the invasion. The aggressive interdiction effort had to be reconciled with the Allied advance as well, so after 30 August pilots stopped bombing bridges and lines of communications necessary for rapid Allied progress.⁶⁰

By December 1944, the Allies assumed they had matters well in hand,⁶¹ but they were completely surprised by the 16 December German attack in the Ardennes. Fate and planning minimized the Allied air advantage as the Luftwaffe gathered almost 1,400 operational aircraft and the bad weather limited air activity by both sides. The German offensive had foundered by the time weather improved on 23 December, and Allied aircraft flew close air support and interdiction. The Luftwaffe managed 800 sorties that day, but could not blunt the massive attacks. As the ground situation improved, further medium bombers and fighter bombers attacks exploited the German failure, disorganizing the retreat and exacting a heavy toll.⁶²

The Army Air Forces continued coordinated interdiction on the drive to the Rhine River. A concentrated interdiction effort on 22 February disrupted the railway system of western Germany, and IXth TAC protected the bridgehead at Remagen.⁶³ Figure 2-6 details the types of interdiction targets US aircraft attacked in the European Theater from August 1942 until the end of the war. The emphasis on rail shipping is obvious.



Source: *USAF Tactical Operations*, from USSBS.

Figure 2-6. Eighth and Ninth AF Interdiction Targeting

In The Pacific

US Army air interdiction in the Pacific did not match the massive scale of efforts in Europe, but there were several actions worth noting. In Burma, centralized control of the air effort belonged to Maj Gen George E. Stratemeyer as commander of the Eastern Air Command (EAC). Eastern Air Command in 1944 averaged approximately 650 aircraft against just over 300 Japanese planes. EAC achieved air superiority by June 1944 and embarked on offensive attacks.⁶⁴

The tactical and geographic situation in-theater was well suited for interdiction with a single major port of entry (Rangoon) and only one major rail line into the country. A single railway and one unpaved highway limited in-country resupply. Additionally, these lines of communication had to cross many rivers and deep ravines, presenting multiple bridge targets. Allied interdiction isolated forward Japanese forces to the point of starvation. One Japanese account reported,

Our . . . difficulty in operating on . . . the [Imphal] front lies in lack of supplies and air supremacy. The enemy received food supplies through the air route, while our men continued in battle eating a handful of barley or grain.⁶⁵

This effective interdiction campaign, combined with complete air superiority, reduced the Japanese to a state of siege and limited their troop movements almost exclusively to night operations.

East China Campaigns

The 14th Air Force operation in China was even smaller than that of Eastern Air Command. Virtually the only American combat force in China when the Japanese launched Operation Ichigo in an effort to force China out of the war, 14th Air Force aircraft hammered Japanese men and equipment. The attacks disrupted timing, but could not contain the land offensive. Hampered by supply shortages, 14th Air Force officers believed that with sufficient supplies, they could have strangled the Japanese forces and single-handedly defeated Operation Ichigo.⁶⁶

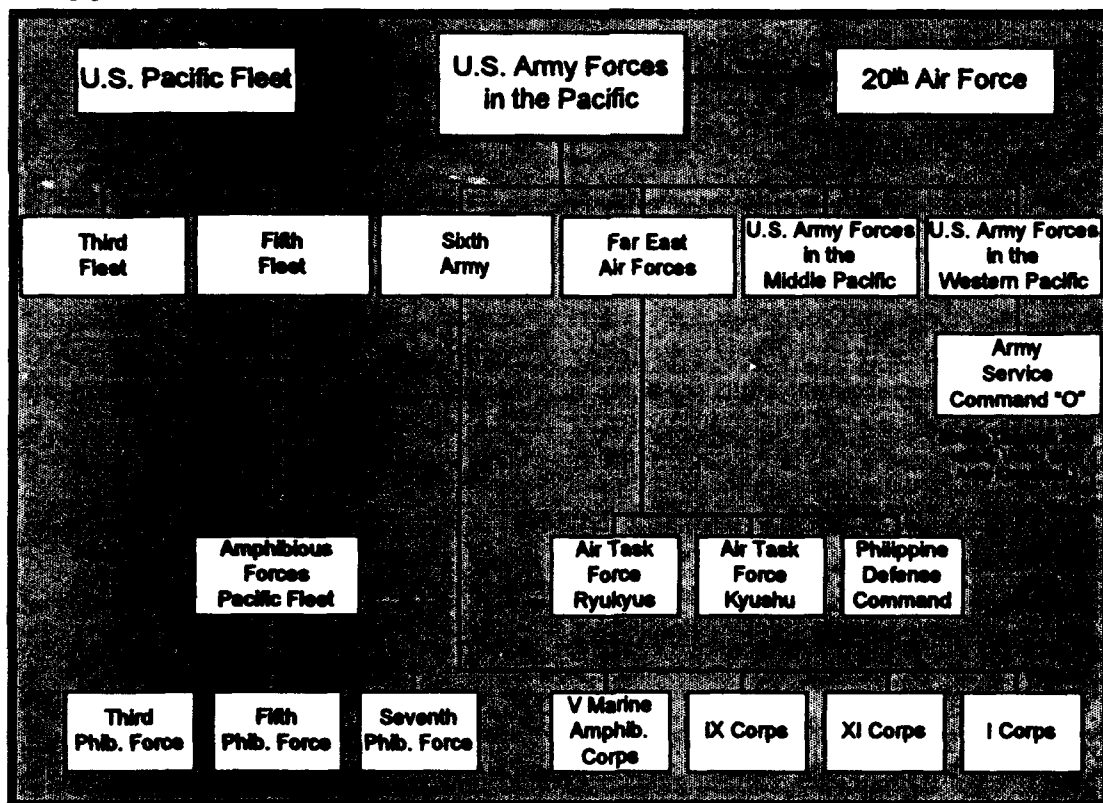
In the Honan Campaign of April and June 1944, 14th AF US and Chinese units were able to delay the Japanese advance and restrict mobility to unmotorized cavalry and infantry drives.⁶⁷ In late May 1944 the Japanese began an attack southward to overrun the 14th Air Force's bases in east central China and met little resistance. The 68th Composite Wing provided the primary resistance to this threat and initially interdicted Japanese troop and supply movements. As the situation grew more precarious during a siege on Henyang, the 68th concentrated on interdiction near the battlefield. This interdiction effort forced the Japanese to relent momentarily, but again American supply difficulties affected the interdiction effort as the 68th ran short of gasoline and could not operate from 17 to 24 July 1944. The Japanese captured the city. The 14th AF commander, Maj Gen Claire Chennault, was convinced that the 68th could have "strangled" the Japanese, *if* they

had adequate logistics support themselves. Perhaps that is a bit optimistic, but Japanese analysis did attribute over 75 percent of resistance to their Ichigo ground offense to the airmen and aircraft of the 14th Air Force.⁶⁸

Command And Control

The realignment after the Kasserine disaster may have taught the US armed forces about centralized control and decentralized execution of air power, but one would not conclude that by looking at the planning for Operation Downfall, the invasions of the Japanese home islands. Figure 2-7 shows the command structure for the invasion of Kyushu, dubbed "Olympic."

Pacific Fleet, Army forces, and Twentieth Air Force are shown as lateral commands, but the relationship is actually much more complex. The commander in chief (CINC) of US Army Forces in the Pacific was responsible to make plans for the campaign and cooperate with the commander in chief Pacific Fleet. The commander of the fleet was to plan and prepare for all naval and amphibious aspects, and to cooperate with the Army CINC. The commanding general was simply to cooperate with both of the above in making plans for the invasion.⁶⁹



Source: *Joint Warfighting* – WS 634 (Air War College), 331.

Figure 2-7. Operation Olympic Organization

This command relationship did not offer any hope of unity of command, with Twentieth Air Force under command of the Joint Staff. It did not appear the US had learned much from Africa or Normandy. After the JCS provided the basic concept, a GHQ US Army Forces in the Pacific staff study complicated the issue further. The study suggests several geographic-based shifts in responsibility for the air effort between Navy and Army commanders.⁷⁰

The service components' bickering over control and the use of shifting geographic areas may be more reasons the United States is fortunate the war ended before invasions of Kyushu and Honshu were necessary. Unfortunately, they set the stage for similar arbitrary geographic divisions in Korea and Vietnam.

Aircraft and Weapons

Almost any US Army aircraft capable of striking surface targets conducted air interdiction during World War II. This may strike many readers as a blinding flash of the obvious, but as this work is written, the blurred distinction between tactical and strategic aircraft and missions is often represented as evolutionary or even revolutionary. Although the theorists of the Air Corps Tactical School at Maxwell Air Force Base, Alabama, in the late 1930s saw a clear distinction between tactical and strategic *aircraft* operations, combat blurred the differences. Strategic bombers and tactical fighters conducted interdiction in both world wars.

Bombs and bullets were the staple interdiction weapons in both wars, and they got bigger and better in World War II. Fighters like the P-38 and P-51 typically dropped 500-pound bombs, and some could fire five-inch rockets. Larger aircraft could accommodate bigger bombs, up to several thousand pounds each. For interdiction missions, they often used 1000-pound armor-piercing projectiles. The standard machine gun was .50 caliber, such as the Browning M2HB (HB for heavy barrel). That gun fired 550 rounds-per-minute, and the heavier barrel allowed longer firing passes. The P-38 and some medium bombers also carried 20-millimeter cannons in the nose, well suited for interdiction.⁷¹

Summary

From roots in World War I, air interdiction grew into the most prevalent tactical mission of World War II. Enemies often got "around" interdiction by shifting movements to nighttime or developing transportation work-arounds, so it was impossible to "strangle" an adversary. Fixed targets like bridges and railyards were comparatively easy to find, but targeting moveable objects was not so easy. Interdictors often resorted to armed reconnaissance, a dangerous business exposing them to ground fire. Therefore, interdiction was more productive when land force maneuver made the enemy move on the Allies' schedule. Normandy was a perfect example of such an environment. Interdiction

could decimate a retreating enemy, but had to respond rapidly to such situations. The Allies were unable to do so during the German withdrawal from Sicily.

General Mitchell recognized the importance of centralized control and decentralized execution in that war and organized his air effort accordingly. Unfortunately, between the wars, fascination with strategic bombing eclipsed that lesson. Command and control after Casablanca emphasized that basic principle of air doctrine, but the structure envisioned for the invasion of Japan reverted to a complex, disjointed series of command relationships.

The United States military forces should have entered the war in Korea with an interdiction strategy that used centralized control to allow it to react rapidly in a coordinated effort. The Air Force should have realized that interdiction had limited impact during a static ground situation, and that choking an enemy was prohibitively expensive, and perhaps unattainable. Unfortunately, in five short years America became complacent, and the military lost sight of many of the lessons of the world wars.

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Chapter 3

Limited Wars and Limited Interdiction

From V-J day until the North Koreans invaded South Korea on 25 June 1950, several key events occurred. Air power advocates finally got their wish in September 1947, when the US Air Force became a separate service. That, however, was the good news. The newly independent air arm was a shadow of its former World War II self. Further, the American defense establishment had become fixated on nuclear war and was ill-prepared for any conventional conflict. The transition to jet aircraft added turmoil to members of the fledgling service.

Korean War Interdiction

When the American air effort in Korea began in response to the 25 June 1950 North Korean invasion, there was little prior planning. Despite that, interdiction was one of the first missions during the evacuation of American civilians.¹ US Air Force leaders were optimistic about the potential for air interdiction in Korea, and they were singing its praises within months. Gen Otto P. Weyland, Commander of the Far East Air Forces, asserted in December of 1950 that interdiction was second only to air supremacy in its contribution to the overall theater mission.² That may have been, but it was certainly a difficult six months in the interim.

General Weyland's optimism is surprising considering a frequently cited quotation about air interdiction in Korea. It is almost impossible to find a document on Korea that does not repeat the words of the Far East Air Forces deputy for materiel in June 1951. Brig Gen Darr H. Alkire reportedly said,

It has been stated by commanders in Korea that the one man they would all like to meet when the war is over is the G-4 of the Communist forces. How he has kept supplies moving in the face of all the obstacles is a real mystery. He has done it against air superiority, fire superiority, guts, and brawn.³

This concession to the enemy is a tacit admission of failure. It acknowledges that 47.7 percent of Far East Air Force sorties from 26 June 1950 until the end of the war (see fig. 3-2), were relatively ineffectual and did not achieve their goal.⁴ While some leaders maintained that the USAF "simply applied the lessons of World War II,"⁵ one might just as easily have claimed they ignored them.

The Korean War did offer some new twists on the interdiction story, such as introduction of jet aircraft and use of political sanctuary. The fundamental scenario, however, was reminiscent of World War II in Europe. The USAF had the numerical advantage; air superiority was the norm. Interdiction on the defensive during the initial retreat brought back memories of the Battle of the Bulge, the march towards the Yalu resembled Patton's rush across France, and the stalemate along the 38th Parallel conjures up visions of Italy.

Early Operations

Far East Command's planned mission was limited to protecting U.S. citizens in Korea, but moved quickly to include close air support and interdiction. It was some time before the Air Force could mount a coordinated interdiction campaign, as a turf battle over direction of the air effort developed almost immediately. In a situation similar to that in Africa in 1942-43, many Army officers wanted to tie the entire air effort to the ground campaign through the General Headquarters (GHQ) Target Group. The Target Group's first list of surface targets was limited almost exclusively to the immediate battle area, and one-fifth of those targets did not exist.⁶

By 15 July 1950 the Far East Air Forces was proposing an interdiction program with the following objectives:⁷

1. Relieve pressure on ground forces.
2. Accomplish and maintain isolation of the battlefield.
3. Inhibit the North Korean ground forces in their attempts to supply front line units.

Planners saw persistence as key to the success of this effort, and the plan noted, "In order to be effective, this interdiction program must be implemented from beginning to end, and then sustained."⁸

Far East Air Forces' vice commander Major General Weyland assumed his duties the next day. He used his experience in Europe supporting the Third Army to analyze the situation and propose an alternative. He recognized that the GHQ Target Group was almost all Army, and that its members did not have the necessary expertise for a coherent air targeting strategy. Lt Gen George E. Stratemeyer, FEAF commander, took Weyland's advice and recommended establishment of a Far East Command Target Selection Committee to reach mutually acceptable targeting decisions. On 26 July, General MacArthur finally approved the Target Selection Committee.⁹

The comprehensive interdiction campaign started two days later, 28 July 1950. Interdiction close to the battle area and close air support continued to receive priority, but even the chairman of the Target Group acknowledged the apparent effectiveness of interdiction in the successful defense of the Pusan perimeter.

It is very evident from a study of this map and the road and rail lines, that the operations of the enemy have been seriously impeded by the bombing operations and that his concentration of troops and supplies, had we not hit these centers, would have been so much more easily accomplished that our forces certainly would not have been able to withstand the continued assaults as effectively as has been the case.¹⁰

The interdiction campaign had two facets. The first phase attacked strategic transportation targets deep in enemy territory and the second closer to the battle area.¹¹ General MacArthur gave in to Far East Air Forces' urgings for an interdiction campaign on 3 August and approved a plan for "a line cut across Korea, north of Seoul, to stop all enemy communications moving south." Two B-29 groups were to accomplish the cut.

The effort seemed to be successful as the attacks, focused on bridges, downed over 140 bridges by 12 September. Unfortunately, the loss of bridges throughout the war did not significantly impact the Communists. They used crude materials, mass labor, and ingenuity to rapidly repair them. Even so, the attacks did impede movement north as the tide turned.¹² During this period, night interdiction efforts began with B-29s dropping flares to illuminate targets for light bombers.¹³ The night posed problems for interdictors for the remainder of the war as the enemy made the most of the dark sanctuary.

The tactical interdiction identified a problem, timely target location and dissemination, that reappeared in Vietnam and the Persian Gulf. The strategic target list proved accurate and valid, but many targets on the tactical list turned out to be nonexistent or of very little value.¹⁴ Navy dissatisfaction with the targeting process contributed to a fractured command and control system that stifled centralized control of the air effort. One cannot blame the Navy for being skeptical, given some of the early interdiction results. On 16 August 1950, ninety-eight B-29s went against a suspected assemblage of 40,000 North Korean troops north of Pusan. Their 1,000 tons of bombs did not produce a single verified enemy casualty.¹⁵ Armed reconnaissance remained the most reliable target acquisition method throughout the war.

As the tide turned with the advance from the Pusan perimeter, interdiction was more profitable. A 10-day effort before the landing at Inchon isolated the area from reinforcement without revealing the invasion plan. After the successful invasion, interdiction delayed the enemy retreat and destroyed forces and material. As the UN troops sped north, meaningful interdiction became more difficult. The remaining targets were sandwiched between friendly lines and the restrictions at the Manchuria-Siberia border. Additionally, much as it had in Europe during World War II, interdiction aftereffects hampered UN troop movement during the rapid advance.¹⁶

Chinese Intervention

As UN forces pushed to the Yalu River, concern about Chinese Communist intervention grew. With that concern in mind, General MacArthur ordered air interdiction of the Yalu bridges. Concerned about the risk of mistakenly bombing China, officials in Washington also doubted the potential for success. President Harry S. Truman delayed the attacks pending consultation with the British, much to MacArthur's dismay. He lodged a strong protest and finally the strikes began. However, the doubts about the ability to stop Chinese movement across the Yalu were well founded. The effort yielded paltry results despite dropping almost half of the bridges. The Chinese used pontoon bridges and sheer weight of effort to bring their forces across and enter the war.¹⁷

As the Chinese drove the UN forces south, concentrated air interdiction sought to slow their advance. The Chinese seemed impervious to air attack as they pursued the Eighth Army, continuing to march through strafing attacks and even leaving their lights on under night attacks. Armed reconnaissance missions claimed some 30,000 troops killed or wounded by 16 December 1950, but these losses did not stop the Chinese. The attacks

forced the Chinese back to more traditional movement and concealment in late December and their march slowed. The new threat of Chinese MiGs and other support requirements limited interdiction efforts as the year ended.¹⁸

The march south stretched Chinese supply lines to their limit and made them more vulnerable to air attack. The Far East Air Forces Interdiction Campaign number four included the largest, most persistent effort to date in late January 1951 and contributed to the decreasing combat effectiveness of the Peoples' Army.¹⁹ They achieved this despite increased interference from the Chinese Air Force. The MiGs did restrict interdiction activity further north in the area known as MiG Alley.²⁰

Before the Chinese retreat, another factor hampered interdiction. The Air Force had to withdraw all their forces other than two F-51 wings from the Korean peninsula to Japan because of the enemy advance. Reduced weapons payload allowed more fuel, but not sufficient time-over-target for target acquisition. For escort fighters, their limited fuel hurt their capability to engage enemy aircraft over MiG alley and increased strike aircraft losses.²¹ The cost of the interdiction campaign increased and its effectiveness decreased through the spring, but by May the battlefield tide had turned and the enemy was retreating northward.

Operation Strangle (Part II)

The ground situation eventually stabilized near the 38th parallel. Far East Air Forces leaders must not have understood the limited impact of the first Operation Strangle in Italy, as they chose to use the same name for a major interdiction effort that started 31 May 1951.²² Fifth Air Force's primary missions in December 1950 were air superiority and close air support for the Eighth Army and Marine forces. General Stratemeyer attempted to reconcile those priorities with an interdiction campaign. This study calls that campaign Strangle II to differentiate from its World War II predecessor.²³

Strangle II targeted enemy forward areas and rear lines of communications. The results seemed to be very impressive with claims of 117,000 enemy troops, 1,315 gun positions, 296 tanks, and over 80,000 buildings. Another 13,000 vehicles, 2,600 freight cars, and 250 locomotives were supposedly destroyed.²⁴ These impressive results may have kept the Chinese and North Koreans from expelling US forces from Korea, but they certainly did not "strangle" the enemy.

Planners intended this campaign to destroy "all supplies and their means of transport to the front lines...the means of accomplishing this end were to include systematic destruction of road bridges, rail bridges, tunnel entrances, vehicles and the supplies themselves." USAF forces and Marine and Navy forces under Fifth Air Force's control flew Strangle II missions, and the impact was fairly positive during the advance north back to the 38th parallel.²⁵

As the ground situation stabilized, the Communist supply needs were not as immediate, and they had time to rebuild their battered transportation network. They had

no shortage of manual labor for repair efforts, and quickly developed intricate alternate route structures. As Strangle II moved into July, the effort lost effectiveness. Far East Air Forces analysts noted simply that the operation failed "... due to the flexibility of the Communist logistic system."²⁶

There were other reasons for Strangle II's failure. FEAF could not totally knock down the three major bridges across the Yalu, nor could it shut off rail traffic leading from Manchuria. Limited night attack capability gave the enemy a dark sanctuary as it had in World War II. For a short time rail lines were destroyed faster than they could be rebuilt, but eventually the enemy broke the blockade. The Communists continued to supply their forces throughout.²⁷

A U.S. history summarized the effort this way:

The interdiction campaign had become the despair of all concerned, and at Air Force headquarters the publicity given the code name "Strangle" was bitterly regretted. Rails could be broken, trains shot up, bridges knocked down, and truck formations harassed, but the enemy continued, largely through night movement, to accumulate supplies in the forward areas.²⁸

General Weyland had a more positive view of Strangle II, citing its success at punishing and increasing the cost of combat for the enemy.²⁹ One may maintain, however, that any cost an enemy can afford is relatively unimportant to the outcome of battle. The one question that cannot be answered, except in speculation, is whether or not the Chinese would have defeated UN forces in the absence of that interdiction.³⁰

Operations Saturate and Pressure

Far East Air Forces leaders were searching for an effective interdiction strategy (and a more appropriate name) when they replaced Strangle II with Operation Saturate in March 1952. Saturate was a 24-hour-a-day campaign focused on key railway segments.³¹ An example was a four-day series of raids totaling 476 sorties against a single section of track between Chongju and Sinanju. These attacks were just as ineffective as Strangle II; the railway was repaired and back in service just five days later. The enemy responded to Saturate by increasing surface-to-air defenses along the important rail lines and exacted a high toll for the persistent air attacks. Although they cut the Sinuiju to Sinanju railway most of April, the cost far exceeded the benefit; the enemy shot down 243 US aircraft and damaged another 290.³²

Far East Air Forces pursued an alternative and nearly simultaneous approach to interdiction beginning 11 March with Operation Pressure. Planners were to select Pressure targets based upon

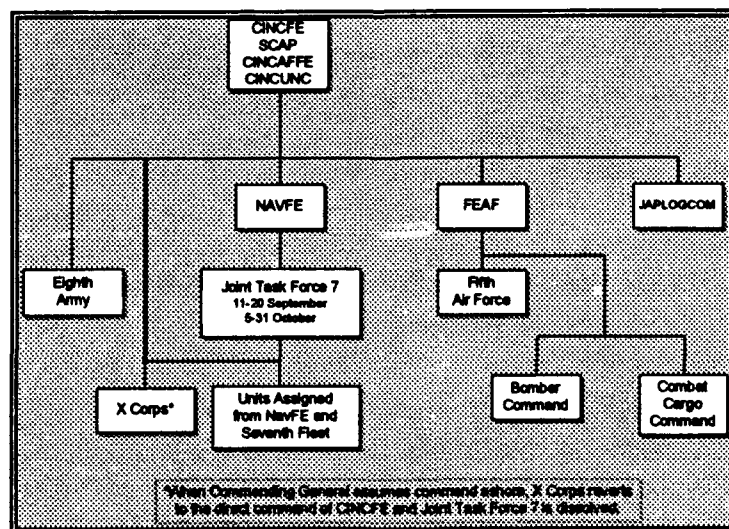
1. the effect of their destruction upon the enemy,
2. vulnerability to available air weapons, and
3. cost of the air effort to friendly forces.³³

This commonsense approach to interdiction remained the basic guidance until the end of the war. Planners hoped the Pressure attacks would increase the cost of war to an unacceptable level and force the Communists to settle the conflict at Panmunjom. The July 1952 Pressure/Pump attacks against command posts, supply dumps, factories, troop billets, railway facilities, and gun positions were typical of these air strikes. This was the largest strike campaign of the war and claimed good results against almost all targets, including 1,500 buildings destroyed and 7,000 enemy casualties.³⁴

Command And Control

Interservice rivalries, lack of joint doctrine, and poor communications complicated command and control of air assets during the Korean War. Once naval aircraft joined the effort on 3 July 1950, the turf battle began. The Air Force wanted to run an integrated air campaign, but the Navy was very reluctant to surrender control to anyone. Further complicating the command and control issue, Stratemeyer formed a separate Bomber Command for heavy bombers. Bomber Command forces were separate from Fifth Air Force, but at least fell under FEAF.³⁵

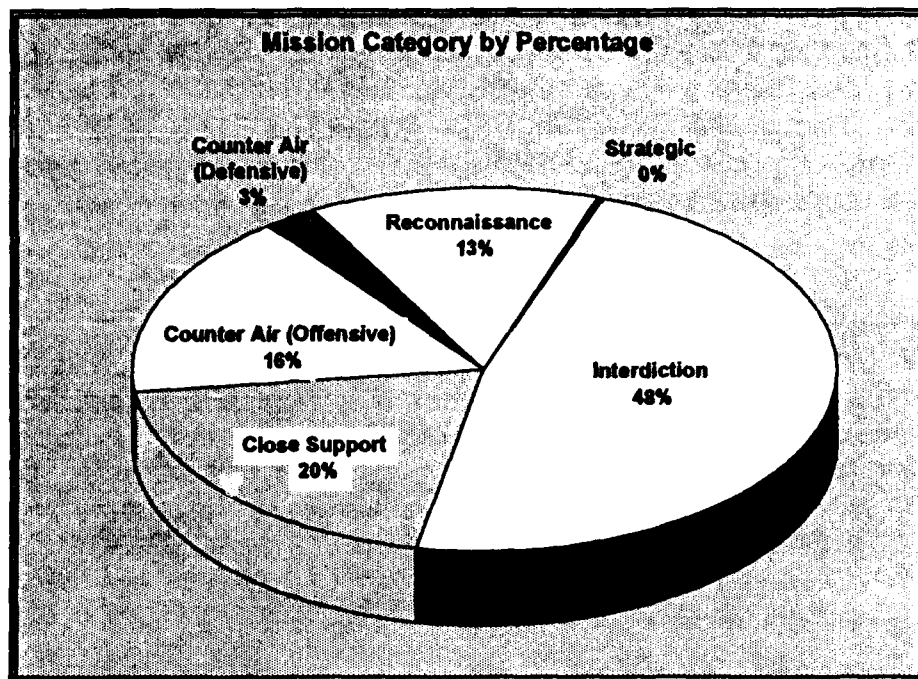
The services ironed out some of the disagreements before the American landing at Inchon. Figure 3-1 shows the command relationships at the time of the Inchon and Wonsan invasions. While the illustration appears to show three component commander equivalents, Navy and Marine air assets were still not under the overall coordination and control of FEAF. General Stratemeyer objected to this arrangement, but General MacArthur overruled him.³⁶



Source: Winnefeld, 402.

Figure 3-1. Command Relationships

Beyond rivalry, targeting was a real problem. General MacArthur's focus was on the land campaign, and he viewed air power as an adjunct. After the initial problems with GHQ Target Group, Far East Air Forces quickly (July 1950) established a joint operations center (JOC) to coordinate the air effort. Communications between geographically split staff functions continued to be atrocious. When they could communicate, the services did not agree on targeting priorities. The first full coordination of an interdiction did not occur until Saturate in March 1952, almost two years after the invasion.³⁷ Even though interdiction may have lacked effect and credibility during the war, it still accounted for the bulk of tactical aircraft sorties. Figure 3-2 shows the apportionment by mission category for the entire war.



Source: *USAF Statistical Digest*, FY 1953, 20.

Figure 3-2. Korean War Sortie Apportionment

Aircraft and Weapons

Early jet fighters were not well suited for Korean War interdiction. Higher cruise speeds and poor low altitude fuel economy made it difficult to spot targets and to spend much time in the target area. With 385 jets in theater and only 56 conventional F-82s and F-51s at the start of the war, the Far East Air Forces acted quickly to acquire more F-51s.³⁸ The USAF continued to use conventional (not jet) World War II-era aircraft like the F-51, A-26, and B-29 through the end of the war. While they offered advantages over their jet successors, these older and slower planes were more vulnerable to enemy MiG

attack and ground fire. For example, from August 1951 to April 1952, the FEAF only received 131 replacement aircraft for the 533 lost or damaged in interdiction.³⁹

The Air Force did attempt to overcome night combat limitations. One early technique teamed B-29s and B-26s. The B-29s dropped illumination flares, then B-26 crews followed up with low altitude bombing and strafing attacks. Despite some success, FEAF abandoned the method as too costly. Later, single-ship night missions dropped their own flares, but the lack of high quality flares hindered the effort. Short-range navigation (SHORAN) offered a potential solution to the night problem, and to attacking targets through cloud cover. SHORAN worked well enough against fixed targets, but not in areas without proper map coverage or against mobile targets.⁴⁰

During the war, new and innovative interdiction weapons played interdiction roles. Small bombs with delayed fuses complicated the repair process, and they foreshadowed cluster bomb units (CBU) of later wars. Two guided bombs preceded today's smart bombs. One thousand-pound RAZON bombs (actually of World War II vintage) used radio signals from a navigator for guidance, but lack of training and high failure rates limited their success. The difficulties destroying bridges led to the 12,000-pound TARZON bomb. With a direct hit, they did the job, but only seven of the first 30 hit the target. They were dangerous, too, and a TARZON failure cost a B-29.⁴¹

Korean War Lessons Learned

Far East Air Forces analysts cited four primary lessons from air interdiction operations in Korea:

1. The best time for an interdiction campaign is when the ground situation is fluid, the fighting is intense, and the enemy's logistic needs are the greatest.
2. Medium and light bombers are more effective against communication arteries in the rear than against front line capillaries.
3. We need new weapons and tactics to correct our interdiction deficiencies and to counter passive defense tactics developed by our enemies in the Korean War.
4. Even in a static ground situation, an enemy's ability to fight can be substantially reduced by a well-planned and aggressive interdiction campaign.⁴²

Item 4 is debatable, and the analysts seem to have omitted others that were reasonably obvious. The sanctuary in China seriously hampered the interdiction effort, limiting attacks, restricting tactics, and preventing air superiority. American night interdiction capabilities were very limited and needed to be improved. The direct impact of logistics-based interdiction was very difficult to evaluate, especially against an army with limited supply requirements.

A Fifth Air Force general summarized the difficult nature of determining the benefit of air interdiction in Korea, or anywhere else for that matter. At a December 1951 briefing,

while discussing Communist plans for another offensive (as reported by captured enemy soldiers), he noted,

Although the enemy has made no large-scale attack, we don't know whether that is the result of the interdiction or whether he never intended to attack.⁴³

After Korea

After Korea basic Air Force doctrine emphasized strategic warfare and reflected the nation's preoccupation with nuclear war. Writers cited the three potential effects of air action: destruction, capture, and neutralization of an enemy. They foresaw two types of air attack, heartland and peripheral. Attacks would be most effective when made against the whole of society, and the emotional response of the enemy people would be critical.⁴⁴ A version of *United States Air Force Basic Doctrine* (AFM 1-2) published a year after the Korean War made it clear the war had not only worn out the American people, but had convinced many there would never again be such a prolonged conflict. "The familiar strategy of military forces engaged in an extended struggle of attrition has proved costly and inexpedient."⁴⁵ Again the publication focused on decisive, general, and implicitly, nuclear war.

AFM 1-3, *Theater Air Operations* (1953), described the Air Force version of the ascendancy of air power, and reinforced the idea that interdiction could make surface action too costly for an enemy to pursue. The authors saw interdiction targets in two categories, troops and supplies, and believed that linking interdiction to strenuous battle magnified its effectiveness. Summarizing the goals of an interdiction campaign, they wrote,

When an enemy's forward reserves are depleted, and when his forces have limited freedom of movement, the combat effectiveness of his forces will be greatly reduced and there will be created a situation favorable for exploitation. It is to the creation of this situation that interdiction operations are dedicated.⁴⁶

Theater Air Operations noted the role of the theater commander in establishing targeting priorities, and cautioned planners not to squander air assets against low-value targets. The manual cited some general criteria for target selection, including vulnerability, identifiability (sic), and recuperability. A consideration of vulnerability was the value a given target had to an enemy's overall combat effort.⁴⁷

During the same period, in FM 100-5, *Operations*, the Army expressed its doubts about air power's influence on a campaign, claiming, "In any case, the efforts of all components are directed toward insuring the success of the land operations." The Air Force had not gotten the message, as an Air War College author noted, "... military men agree that air power or the air element is dominant over surface elements."⁴⁸ It seemed proponents of both air and land power had been backpedaling since 1943.

Army Lt Gen John E. Dahlquist, addressing the USAF Scientific Advisory Board in 1954, foreshadowed the current conflict over interdiction management. He asserted that the increased mobility of land forces compelled the land commander to direct air and naval

weapons forward of his rear boundary. "Control must include the authority to assign and suspend air and naval support missions."⁴⁹ This turf battle obviously predates the Army's interest in "Deep Battle."

Despite that controversy, most Air Force doctrine of the era paid homage to the gods of strategic bombing with the new nuclear twist, and there was little evidence that substantive lessons came out of the experience in Korea.⁵⁰ The U.S. possessed very limited conventional capabilities in the late 1950s. In the Army, only the 82nd Airborne was remotely ready, and that unit still had to borrow equipment to meet combat requirements. Most of the tactical air forces were equipped with 1955 vintage F-100's. As a result, the Air Force entered air combat operations in southeast Asia with a force ill-prepared and ill-equipped for any conventional conflict, much less limited guerrilla warfare in a jungle environment.

The US had almost given up on conventional weapons by the late Fifties. In the Berlin Crisis of 1958, President Dwight D. Eisenhower refused to commit resources to conventional forces and his National Security Policy (August 1959) reaffirmed reliance on nuclear weapons as basic to all contingency planning. This policy gave no consideration to limited war with USSR, and weapons system procurement also reflected the emphasis on nuclear warfighting. Even tactical aircraft of the era such as F-100s, F-105s, and B-57s were capable of nuclear weapons delivery, and USAF research and development efforts emphasized the strategic nuclear force. That emphasis came at direct cost to tactical forces, leading to a 20 percent reduction in the number of tactical wings. The remaining tactical forces emphasized close air support of Army, not interdiction.⁵¹

The Kennedy administration changed the emphasis in Fiscal Year 1961 when the tactical force increased from 32 to 43 wings, and the Air Force purchased the first of its F-4Cs. Nuclear retaliation still had priority, but the shift in emphasis acknowledged the importance of forces and doctrine for limited conventional wars. The revitalization of conventional warfighting weapons began in earnest finally in fiscal year 1966 when the Southeast Asia budget amendment submitted for FY 1966 more than doubled tactical aircraft purchases, principally F-4s.⁵²

Southeast Asia

Air interdiction in Southeast Asia was an unfortunate magnification of efforts in Korea. Like Korea, there were long periods of strategic stalemate, extreme political constraints, changing objectives, and an Asian adversary seemingly immune to supply interdiction. The constraints were even more pronounced than they had been in Korea, and the misapplication of air interdiction proportionately worse.

Advisory Years

When the Eisenhower administration committed advisors to Vietnam, the advisors aimed their efforts at helping South Vietnam prepare for a Korean-style invasion. They made little effort to prepare for guerrilla warfare. President John F. Kennedy took office with those advisors in place, and with an interest in guerrilla warfare. Even though the

Army didn't like his emphasis on low-intensity conflict, JFK reoriented the Special Forces in that direction and set up a counterinsurgency group in the White House.⁵³

The Viet Cong used aircraft only for resupply, so initially there was no need for a traditional counter air campaign. As Viet Cong activity increased, the US began to provide the Vietnamese Air Force more advice and equipment. The aircraft included T-28s and B-26s, and later, A-1Es, but not jet aircraft. The Geneva accords prohibited augmentation of materiel, like the introduction of jets, allowing only normal replacements.⁵⁴ These programs emphasized aircraft capable of carrying large amounts of air-to-surface weapons from forward strips. USAF advisors trained Vietnamese aircrew, but believed they were in Vietnam primarily to conduct air support at the request of US ground advisors. In 1962, the role of US air power expanded with the introduction of F-102 air defense jets.⁵⁵

U.S. Air Force advisors' early combat missions included close air support and several others, but not interdiction. The Americans knew Viet Cong supplies were entering the country from North Vietnam, but detailed reconnaissance did not start until mid-1964.⁵⁶ Even then, the only interdiction was a few clandestine strikes and retaliatory attacks like the 5 August 1964 raid after the Gulf of Tonkin incident. Even the Flaming Dart strikes in February 1965 were punitive in nature and did not represent an earnest attempt at interdiction. President Lyndon B. Johnson felt that a "sudden and effective" airstrike would convey commitment to the South Vietnamese and persuade North Vietnam to limit their support of the insurgency.⁵⁷

The Johnson administration concluded in early 1965 that it would take more military involvement to avoid defeat. LBJ still maintained that two Marine battalions landed originally for airbase defense would not engage in day-to-day actions, but eventually the rules of engagement allowed "more active" use. By June 1965, South Vietnam was near collapse and General Westmoreland recommended more troops. Westmoreland's military strategy envisioned a more-than-doubled ground force destroying as much as 50 percent of enemy base areas, while ensuring base security and security for population centers under friendly control.⁵⁸

Rolling Thunder

Rolling Thunder had at least one positive aspect; at least it was not dubbed "Strangle III." The Rolling Thunder bombing campaign illustrates the complex nature of air interdiction in southeast Asia. Rolling Thunder was not a purely military campaign, nor was it purely interdiction. The objectives were not clear, nor was the targeting process. The Rolling Thunder operations from 1965 through most of 1968 attempted to reconcile contradictory elements. The first was the restrictions aimed at preventing escalation beyond Vietnam and managing public opinion. The next was the coercive goal, compelling North Vietnam to reduce its role in the South. Finally, the campaign sought a direct military impact on supplies and forces, traditional interdiction. Rolling Thunder achieved none of its objectives.⁵⁹

Rolling Thunder started on 2 March 1965 with strikes just north of the demilitarized zone (DMZ). It was hardly an interdiction campaign, but did include some interdiction objectives. The first Rolling Thunder attacks hit two types of targets: harassment and strategic. Rules of engagement severely constrained the strikers. Some of the restrictions included prohibiting targets of opportunity, preventing pre-strike reconnaissance, and very limited damage assessment. President Johnson set the objectives for the campaign. He expected Rolling Thunder to support US and allied troops through a demonstration of purpose and deny the enemy its sanctuary. In addition, he sought to punish North Vietnam for violating the Geneva Accords of 1954 and 1962. He hoped Rolling Thunder would limit the flow of supplies or at least increase the cost of the war to the North Vietnamese.⁶⁰

The Air Force, through chief of staff Gen John P. McConnell, advised a more comprehensive intereffort against lines of communication, rail, and highway links with China, ports and supply facilities.⁶¹ Johnson saw the conflict as an international test of manhood, and he was determined to make a statement. That determination overshadowed any military objectives. He had to reconcile those objectives with political considerations, and as a result, finally approved on 18 February 1965 a very limited effort. The raids started on the 20th, beginning a three-year piecemeal effort at coercion, punishment, and to a limited degree, interdiction.⁶²

Rolling Thunder, the longest bombing campaign in history, failed. It did not force the North Vietnamese out of the war. It did not cripple their meager industrial base, and they did not stop funneling support into South Vietnam.⁶³

There were many reasons the interdiction objectives were not achieved. The restrictions prevented a coherent attack and the targeting process, orchestrated from the White House, further crippled the effort. Despite the size and duration of the effort, in 1967 strikes hit only 60 percent of the high value targets the JCS identified during the first two years. Commander in Chief, Pacific Command later estimated that less than one percent of the combat sorties flown in North Vietnam were against JCS-recommended targets.⁶⁴ Bombing north of the 20th parallel stopped on 31 March 1968, and President Johnson further restricted attacks to the area south of the 19th parallel. This ended a failed effort and began a four-year bombing hiatus for North Vietnam.

Interdiction Down South

Rolling Thunder illustrated the inherent problems of interdiction complicated by political constraints and absence of clear military objectives. Jungle terrain and an elusive enemy further complicated interdiction in South Vietnam, Laos, and Cambodia.

Early interdiction in Laos included two campaigns, Steel Tiger and Barrel Roll. Steel Tiger sorties struck targets along the Ho Chi Minh Trail while Barrel Roll missions provided close air support for Laotian forces and interdiction in northern Laos. The campaigns were at the mercy of the monsoonal weather pattern as weather good enough

for air strikes was usually limited to November to May each year.⁶⁵ A series of documents analyzing the supply requirements showed the difficulty of such a campaign. Analysts attempted to determine the amount and type of supplies required by the Viet Cong, and the number of strikes required to limit supplies to less than that level.⁶⁶ Another analysis should have illustrated the futility of these efforts; a Rand Corporation study attempted to determine the validity of a North Vietnamese census reached no firm conclusions.⁶⁷ How could one determine the methodology for an effective interdiction campaign when unable to determine even the size of the enemy population?

That fascination with numbers was characteristic of the air war. Defense Intelligence Agency analysts ignored subjective data in favor of numbers to estimate enemy intention and capability. Sortie counts and numbers of trucks destroyed became more important than the actual effects of the strikes on enemy warfighting capability.⁶⁸

The bombing halt in North Vietnam brought increased emphasis (and availability of resources) to interdiction elsewhere. Before 1968, most strikes on the Ho Chi Minh Trail were after weather diverts from strikes into North Vietnam. The Commando Hunt interdiction campaigns started 1 November 1968. Still monsoon-dependent, they were even labeled by season. Odd-numbered series ran during the dry season, even-numbered ones in the monsoon and were not as large or effective. Table 3-1 lists the odd-number efforts. The attacks attempted to maintain around-the-clock pressure on the trail by attack aircraft, fighters, gunships, and bombers. Commando Hunt I's 432 sorties per day seemed to be having the desired effect as the mathematicians determined that only 19 percent of the enemy supplies made it as far as South Vietnam.⁶⁹

From November 1969 into 1970, Commando Hunt III claimed similar results even though the enemy began a series of countermeasures. The North Vietnamese prepositioned men and equipment across the border waiting for the weather to allow travel.⁷⁰ Of course, the same weather that allowed road travel made air attacks more likely. Just as the Germans in Italy and Chinese in Korea had done, the North Vietnamese developed ways around supply-oriented interdiction. They increased repair forces and air defenses, including surface-to-air missiles as far south as Route Package I (see fig. 3-3) by 1970.⁷¹

To match the increased countermeasures, the Air Force added tonnage and technology. The AC-130 gunship aircraft replaced older AC-47s and AC-119s. They had greater firepower and better nighttime delivery systems. To improve the odds of locating valid targets, Igloo White used high-technology sensors to overcome the dense jungle canopy. The claims of Commando Hunt were very impressive. Impressive, but ineffective. The North Vietnamese stockpiled sufficient supplies in Laos and Cambodia to support a massive invasion of South Vietnam in 1972.

Table 3-1
Commando Hunt Claims

Commando Hunt	Start	Finish	Trucks Destroyed	Tons Sent	Tons Delivered	Avg Sorties Per Day
I	<i>1 Nov 68</i>	<i>30 Apr 69</i>	<i>6,000</i>	<i>45,000</i>	<i>85,000</i>	<i>432</i>
III	<i>Nov 69</i>	<i>Apr 70</i>	<i>1,000</i>	<i>54,000</i>	<i>19,000</i>	<i>317</i>
V	<i>10 Oct 70</i>	<i>20 Apr 71</i>	<i>21,000</i>	<i>61,000</i>	<i>7,000</i>	<i>304</i>
VII	<i>Nov 71</i>	<i>Apr 72</i>	<i>10,000</i>	<i>31,000</i>	<i>5,000</i>	<i>N/A</i>

Source: *Development of Interdiction Doctrine and Strategy in the USAF.*

An interdiction effort in the A Shau Valley area of South Vietnam from early December 1968 until the end of the following February was a "major effort" to deny the Viet Cong valley shipment routes and storage points. This was just one of a series of interdiction campaigns in the A Shau Valley. Again, locating targets was extremely difficult and the entire campaign was directed by forward air controllers (FACs). After two months of intensive strikes, the director of the controlling direct air support center (DASC) reported that after the operation Marines moved into the area and discovered, "the largest supply and ammunition storage area ever found in Vietnam."⁷² Like Commando Hunt and Rolling Thunder, this interdiction was not very effective.

Linebacker

Backlash from the invasion of Cambodia spurred President Nixon to pursue Vietnamization with renewed vigor. That strategy dramatically reduced US ground forces in Vietnam with two basic goals. First was a negotiated cease-fire. Second, Vietnamese forces would replace American combat, combat support, and support forces. Nixon's secretary of defense, Melvin Laird, oversaw the Vietnamization and probably pushed it faster than prudence might dictate.⁷³ Still, the ARVN forces performed reasonably well, contrary to Giap's expectations, *so long as they had US air and logistical support.*

In early 1972, the North Vietnamese mounted a major invasion that nearly succeeded until the massive reintroduction of US air stemmed the tide. The US responded to the invasion with an infusion of air power from within theater and the CONUS to attack North Vietnam with three objectives:⁷⁴

1. Destroy the war-related resources already in North Vietnam.
2. Reduce or restrict supplies received by North Vietnam from external sources.
3. Interdict lines of communications to impede the movement of men and supplies into Laos and South Vietnam.

Linebacker had two significant differences from the ill-fated Rolling Thunder. The target restrictions were far fewer, and precision guided munitions increased the lethality of

the air strikes. Many previously prohibited targets were struck, ports were mined, and B-52s participated in the missions. The impact of precision munitions was clear. The first laser-guided bomb (LGB) attack on 13 May 1972 destroyed one span of the Thanh Hoa railroad and highway bridge. That bridge was impervious to two years of attacks during Rolling Thunder, but further LGB attacks kept it out of service for the rest of the war.⁷⁵ Desert Storm observers often cited that war as the emergence of precision munitions. In fact, they had proven their effectiveness nearly 20 years earlier against North Vietnam.

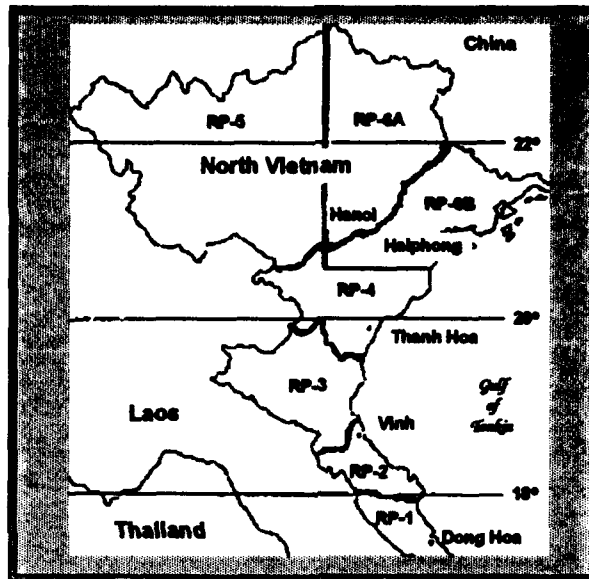
Linebacker II

Initially it appeared Linebacker would force the North Vietnamese to agree to a peace agreement and end hostilities. When they stalled again in November 1971, President Richard M. Nixon ordered the Linebacker II strikes of approximately 1000 sorties from 18 to 29 December. Although it was not an interdiction campaign per se, but more akin to a strategic bombardment effort, there were applicable lessons for interdiction planners. Again, the importance of centralized control was written in blood. A fractured command structure that kept B-52s under the control of Strategic Air Command headquarters in Omaha, Nebraska, limited flexibility and cost lives.⁷⁶ Inflexible planning, predictable tactics, and unnecessary losses resulted.

Even with those problems, the strikes were much more effective. Most target restrictions lifted, and attacks on surface-to-air missile batteries and storage finally led to true air superiority. B-52s and F-111s provided a night attack capability that allowed the effort to be persistent over the daily continuum. The 11-day effort exhausted enemy air defenses and crushed North Vietnamese resistance.⁷⁷

Route Packages

The Route Package system illustrates the disjointed nature of American air attacks on North Vietnam. An Air Force-Navy Coordinating Committee devised the system of six target areas covering North Vietnam in November 1965 to delineate service targeting responsibility. Originally, Seventh Air Force and Carrier Task Force 77 exchanged areas every week; later the shift occurred monthly to reduce confusion. In April of the following year, now with seven areas (see fig. 3-2), the Navy and Air Force split responsibilities on a semipermanent basis. Furthermore, the Army commander in the South, General William Westmoreland, gained authority to schedule interdiction missions in Route Package 1, just above the demilitarized zone.⁷⁸



Source: *The Limits of Air Power*.

Figure 3-3. Route Packages

This fragmented approach guaranteed interservice rivalry and made unity of command impossible. It also showed that the US forces had learned little or nothing from the experience in Korea. Perhaps what is more important, by giving Westmoreland control of Route Package 1, the system also introduced Army direction of an interdiction effort. Later, after Desert Storm, Army corps commanders sought the same kind of direct control.

Command and Control

The route package system reflected an extraordinarily large and complex command and control structure. In Southeast Asia, political borders and service rivalries added inefficiencies to the already complicated system. The current command and control system is addressed in chapter 5, so this section covers only high- and low-lights of the system in Southeast Asia.

A formerly Top Secret Air Force report, part of Project Corona Harvest, cited many problems. For one, as originally constituted in 1961, the Military Assistance Advisory Group (MAAG) worked for the ambassador to Vietnam, hardly an optimum command structure. Some changes in 1962 clarified the military situation by establishing a sub-unified command responsible to the commander-in-chief, Pacific. Unfortunately, MAAG still existed and was responsible to two bosses, one military and the other civilian. That confused situation got worse, not better, as force levels increased.⁷⁹

The same report cited a unique aspect of the Vietnam War. Political constraints complicated the command and control structure. Forward air controllers might visually

locate interdiction targets, but they had to get approval to strike them through the tactical air control system. As if that was not enough of a hurdle, later interdiction in or near hamlets and villages that was not directly in support of a ground operation had a further requirement. The inhabitants had to be warned, by leaflet or loudspeaker, before the attack. Then, "sufficient time to evacuate the area" had to elapse before the strike began.⁸⁰ It is difficult to believe *anyone* thought a war could be won in that manner.

Aircraft and Weapons

During the dramatic transition from nuclear deterrence to conventional warfare, almost any Air Force aircraft capable of carrying air-to-ground ordnance played a part in Southeast Asian interdiction. F-105 Thunderchiefs carried most of the load to North Vietnam, later supplemented by F-4 Phantom IIs. Interdiction was not the intended role for the F-105 (nuclear strike) nor the F-4 (Navy fleet defense). The F-4 first went north to escort the F-105s, then carried bombs, and conducted defense suppression.

Defense suppression (more properly suppression of enemy air defenses) became necessary as enemy defenses grew more sophisticated. In World War I, World War II, and Korea, machine guns and cannon were formidable opposition. The North Vietnamese brought surface-to-air missiles (SAM) to the dance. Some of the antiaircraft guns had radar guidance as well. The synergy of fighters, antiaircraft guns, and missiles, interconnected with electronic communication, became known as an integrated air defense system (IADS). The countervailing synergy was force packaging. Force packaging teamed specially equipped fighters with electronic combat gear and anti-radiation missiles with the strike aircraft to offset the SAMs and radar-guided antiaircraft artillery. Force packaging had another element, air-to-air refueling (AAR). AAR gave strike and support aircraft the range and endurance necessary to rendezvous, reach the target, and egress.⁸¹ Despite this improvement over Korean War jet operations, aircraft still ran out of fuel over enemy territory.

F-4Ds and F-4Es had a system called "dive toss" that automated bomb release based on radar range from the target. The system had mixed results in combat, and fell into great disfavor after the war.⁸² Dive toss represented an attempt to use onboard systems beyond a simple sight to improve accuracy. The A-7D and F-111 flew interdiction missions late in the war, and their presence marked the development of "smart aircraft." Both had onboard weapons delivery systems a full generation more sophisticated (and accurate) than on their predecessors. The A-7D had a heads-up display that coupled navigation system and radar ranging to give the pilot steering cues during weapons delivery. The F-111's debut in combat was spotty at best, but besides computer-assisted weapons delivery, it featured automatic terrain-following radar. That combination finally penetrated the barriers to precise night interdiction.⁸³

Just as in both World Wars and Korea, bombers played a major part in air interdiction. B-52s and B-57s flew interdiction and close air support down south early on, and the B-52 was a major part of Linebacker II. Other aircraft used mostly in the South included

the F-100, and propellor-driven A-1 Skyraider. A very different aircraft broke the night barrier down south before the F-111 crossed it in the North.

The war brought a new type of interdiction platform, the gunship. AC-47s, AC-119s, and finally AC-130s served well interdicting the Ho Chi Minh Trail and other supply lines. These converted cargo planes had cannons and machine guns in place of pallets, and were quite effective in low-threat environments and at night. Their long loiter time and low speeds allowed detailed armed reconnaissance, assisted at night with special sensors. AC-130s used electro-optical (TV) and infrared (IR) systems to aim guns up to 105mm at night targets. They proved very effective against trucks in particular, and against tanks during the 1972 Easter Offensive. However, these vulnerable aircraft could not operate against an integrated air defense system.⁸⁴

This war marked several weapons innovations also. Bridge-busting, something RAZON and TARZON were intended for in Korea, was still a difficult and frustrating mission in North Vietnam. Smart munitions finally came of age. They allowed successful strikes on some of the most frustrating targets in North Vietnam, such as the Thahn Hoa bridge noted earlier, and the notorious Paul Doumer bridge. TV and laser-guided bombs not only provided accuracy for killing power, but to allow strikers to operate within the very restrictive rules of engagement and limit collateral damage.⁸⁵

Cluster munitions proved to be effective area and countermobility devices. Called CBUs (cluster bomb units), they consist of a large canister filled with many smaller submunitions. The large unit drops from the attacking aircraft to a specified height, and splits open to spread over a wide area. While each of the bomblets has substantially less killing power than a single 500- or 2000-pound bomb, specialty charges and fusing options made CBUs effective against a variety of target types.

Southeast Asia Lessons

The Vietnam War offered general and specific air power lessons. Limited war with unclear objectives prevented a coherent air campaign. The numerically oriented target and effect analysis made interdiction even less effective. Armed reconnaissance over the jungle proved very difficult. Parceling out geographic spaces for different services to control proved equally untenable.

Despite all the negatives, there were many advances in interdiction technology. Effective night attack became a reality, and precision weapons began to live up their potential. Force packages emerged as the counter to an integrated air defense system. Air-to-air refueling improved strike package range and endurance.

Vietnam also reinforced earlier experience showing any aircraft capable of delivering air-to-surface weapons could accomplish interdiction in appropriate combat environments. Fighters, bombers, and converted cargo aircraft all fit the bill in various circumstances.

Unfortunately political constraints, interservice rivalry, a confused command structure, and anything but centralized control completely overshadowed these advances.

Micromanagement from the highest levels further reduced interdictions' effectiveness. The tactical air control system had grown to unmanageable proportions by the end of the war in Vietnam. Worse yet, Vietnam reinforced a perception within the US Army that began in World War II and grew in Korea. That idea was that air power should always be available "on-call" to support land forces. In Vietnam that went beyond close air support to include air interdiction.

Notes

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- ⁷ Jenkins, 10.
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- ⁹ Futrell, *The United States Air Force In Korea*, 52-54.
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- ¹³ Futrell, *The United States Air Force In Korea*, 156.
- ¹⁴ *Ibid.*, 121.
- ¹⁵ David A. Anderton, *History of the United States Air Force* (New York: Crescent Books, 1981), 144.
- ¹⁶ Frank J. Merrill, *A Study of the Aerial Interdiction of Railways During the Korean War* (Ft. Leavenworth, Kans.: U.S. Army Command and General Staff College), 43-47.
- ¹⁷ Jenkins, 12-14.
- ¹⁸ Futrell, *The United States Air Force In Korea*, 243-45.
- ¹⁹ *Ibid.*, 286.
- ²⁰ *Ibid.*, 292.
- ²¹ Merrill, 62, 64.
- ²² Futrell, *The United States Air Force In Korea*, 297.
- ²³ Jenkins, 14.
- ²⁴ *Ibid.*, 15.
- ²⁵ *Ibid.*, 15.
- ²⁶ *Ibid.*, 17.
- ²⁷ Merrill, 90-95.
- ²⁸ Jenkins, 17.
- ²⁹ *Ibid.*, 17.
- ³⁰ Merrill, 91.
- ³¹ *Ibid.*, 137.
- ³² Jenkins, 20-21.
- ³³ *Ibid.*, 21-22.
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- ³⁵ James A. Winnefeld and Dana J. Johnson, *Command and Control of Joint Air Operations* (Santa Monica, Calif.: RAND), reprinted in Air War College Text WS 634, 397-402.
- ³⁶ Winnefeld and Johnson, 401.
- ³⁷ Merrill, 141-42.
- ³⁸ Jenkins, 7-9.
- ³⁹ Merrill, 144.
- ⁴⁰ *Ibid.*, 78-79.
- ⁴¹ *Ibid.*, 43, 82, 96.
- ⁴² Jenkins, 23.
- ⁴³ Futrell, *The United States Air Force In Korea*, 413.
- ⁴⁴ AFM 1-2, *Basic Doctrine*, (Washington, D.C.: USAF, March 1953), 3, 11, 15-16.
- ⁴⁵ AFM 1-2, *Basic Doctrine*, (Washington, D.C.: USAF, April 1954), 11.
- ⁴⁶ AFM 1-3, *Theater Air Operations* (Washington, D.C.: USAF, 1 September 1953), 11.
- ⁴⁷ *Ibid.*, 1.
- ⁴⁸ Futrell, *Ideas*, vol. 1, 407.

- ⁴⁰ Futrell, *Ideas*, vol. 1, 408.
- ⁴¹ Mark Clodfelter, *The Limits of Air Power* (New York: Free Press, 1989), 27-28.
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- ⁴⁵ Jenkins, 29.
- ⁴⁶ Clodfelter, 67.
- ⁴⁷ *Development of Interdiction Doctrine*, 30.
- ⁴⁸ Clodfelter, 58.
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- ⁶⁴ Herring, 239-40.
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- ⁶⁶ *Ibid.*, 44-45.
- ⁶⁷ Clodfelter, 185-187.
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- ⁶⁹ *Ibid.*, 129-130.
- ⁷⁰ *Designated Study #7, Interim Report*, vol. 2, *Command and Control* (Maxwell AFB, Ala.: Air Command and Staff College, 15 December 1967), 3,4. Originally Top Secret, declassified on 13 August 1991.
- ⁷¹ *Designated Study #7*, 64-66.
- ⁷² Clodfelter, 158-59.
- ⁷³ The author flew F-4Cs without dive toss, and F-4Ds with the system, from 1976 to 1978. During his assignment to Holloman AFB, NM., a scandal resulted from attempts to hide shortcomings in the system by claiming dive toss attacks when training bombs were actually dropped manually.
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Chapter 4

Fulda To The Euphrates And Beyond

The previous chapter described a period when air power, in particular air interdiction, lost effectiveness and credibility. This section addresses its fitful reemergence. As air power theory escaped the doldrums of Korea and Vietnam, the US Army became increasingly interested in deep operations. The Vietnam experience led to a period of painful introspection with a distinctly European flavor and a Soviet focus. The pain was not over, however; the period included a bungled hostage rescue attempt in Iran and the deaths of hundreds of Marines in Lebanon. The American military worked hard to perfect joint operations, particularly after problems in combat in Grenada and Panama. They undertook a comprehensive modernization effort that yielded world-class weapons systems. All the effort did not prepare the American military for combat in the Fulda Gap region of Europe as expected. In January 1991, they entered combat near the cradle of civilization.

Prelude to the Storm

The Air Force did not completely reinvent itself after Vietnam. In many ways the service returned to its doctrinal roots. Analysts found the service had learned almost nothing from our experience in Korea. Tried and true, but temporarily abandoned, centralized control and decentralized execution returned as a key doctrinal concepts. Beyond simple emphasis, the Air Force devoted resources to build an effective tactical air control system (TACS) that could implement the concepts. In 1986, Tactical Air Command commander Gen Robert Russ declared 1986 "The Year of the TACS." He saw the requirement to modernize TACS equipment for battle management and air strike control.¹ The investment paid some dividends, but by Desert Storm, revealed continuing problems, especially in disseminating the air tasking order. The bibliography lists several detailed sources on the tactical air control system.

To better prepare its warriors for combat, the Air Force began the Flag series of training exercises. Red Flag was designed to provide an intense and comprehensive training environment approximating an aircrew member's first ten combat missions. Blue Flag addressed command and control issues, while Green Flag centered on electronic combat aspects of modern air warfare. Checkered Flag prepared CONUS units for deployment to and employment from overseas contingency operating locations. Overseas warfighting commands developed their own series of training exercises, often in conjunction with Tactical Air Command and Strategic Air Command. Joint training exercises with other services became more complex and common.

The doctrinal framework of air interdiction, however, remained largely unchanged by the Vietnam experience. The 14 February 1979 AFM 1-1, *Functions and Doctrine of the United States Air Force*, described,

Air interdiction operations are conducted against the enemy's military potential before it can be effectively used against friendly surface forces. These operations restrict the combat capability of the enemy by delaying, disrupting or destroying their line of communications, their forces, and their resources.²

This definition, a traditional view of interdiction, with reference to "their line of communications, their forces, and their resources," gave equal emphasis to the enemy forces themselves. Supplies and supply routes were still the focus of interdiction until the Army decided it would need interdiction to defeat the Soviet threat in Europe.

New weapons systems included the F-15 Eagle air superiority fighter, the F-16 Fighting Falcon multirole fighter, and the A-10 Thunderbolt II. Of these new jets, the A-10 was clearly the soldier's favorite. Designed for slow speed, maneuverability, survivability, and tank killing, many in the Army felt it a concrete (and long overdue) expression of the Air Force's commitment to support the Army. The multirole F-16 was a capable air-to-surface platform, but surprisingly, the F-15 eventually had the most significant impact on air interdiction. Although the airplane was originally developed with a battle cry, "Not a pound for air-to-ground," the basic airplane became the basis for the F-15E Strike Eagle. The F-15E added avionics, a rear cockpit weapons systems officer, and an improved radar specifically for night long-range interdiction.³

The F-111 finally came into its own after Vietnam. Developed at Secretary of Defense Robert S. McNamara's direction during the 1960s, the "Aardvark" fell far short of its initial intention, that was a do-everything fighter for both services. With engine and avionics upgrades, and the Pave Tack laser and infrared system, it became a much more formidable weapon system. The F-111 had two attributes critical for interdiction, long range and large payload.⁴

AirLand Battle and Deep Operations

There is an old story of Custer departing for Little Big Horn and admonishing the Army, "Don't change anything until I get back!" Many say the Army has shown remarkable discipline in following his guidance, but this period should have laid that myth to rest. The evolution of Army thought and doctrine after Vietnam reinforced land force reliance upon air power for direct and indirect fire power. Many land commanders felt dependent on air support for any chance of success on the battlefield. Indeed, a 1982 survey of Army War College students found that most armor, infantry, artillery, and air defense officers believed they needed a "maximum of TAC air" to accomplish their basic missions.⁵ That reliance was particularly clear facing numerically superior foes like the Soviet-led Warsaw Pact.

The Army developed new doctrine with a vital role for air interdiction, focused on war in Europe. Even though interdiction had fallen into disrepute because of the war in Southeast Asia, Joint Chiefs of Staff chairman Admiral Moorer was aware of its potential. He expressed his beliefs to the U.S. Senate:

God forbid that we base our future on the total concept of operations as they have been conducted in South Vietnam. I think one of the unfortunate outcomes of this is that there has been placed in the minds of many people some question as to the utility, for instance, of air interdiction in a combat environment. And here again it would be a grave mistake, I think, to draw conclusions with respect to the effectiveness of air interdiction solely on the basis of the way it has been conducted in Southeast Asia.⁶

Interdiction's unrealized potential weighed heavily in Army planning for war in Europe. As AirLand Battle evolved and the Army in Europe developed follow-on forces attack (FOFA) theory, they cultivated a reliance on air interdiction directly related to ground maneuver. This is a significant departure from established practice and merits a detailed discussion.

AirLand Battle doctrine developed as the Army moved away from its previous "defense in-depth" doctrine. AirLand Battle addressed the generating and applying combat power at two levels, operational and tactical, while emphasizing aggressive initiative. The Army developed AirLand Battle doctrine partially out of concern about Warsaw Pact forces behind the front lines and not yet engaged in the battle. Planners recognized that the Pact's numerical superiority hinged on successful movement and employment of these forces.⁷

In parallel, NATO planners were considering a doctrine known as Follow-on Forces Attack, or FOFA. FOFA operations were to quickly address the follow-on forces with specific forces. Interdiction was at the heart of FOFA, and centralized control of the interdiction effort was to make it effective within the constraints of space and time. While many saw AirLand Battle as offensively-oriented, NATO leaders insisted that FOFA was consistent with the NATO's defensive nature and its forward defense strategy.⁸

One important aspect of the FOFA concept was a fire support coordination measure besides the FSCL. NATO ground commanders used a reconnaissance and interdiction planning line (RIPL) approximately 80 to 100 km beyond the front lines. This line separated the leading elements of the enemy force from their reserve and follow-on components. Marking the corps limit of responsibility for intelligence and planning, NATO corps commanders selected interdiction targets on the friendly side of the RIPL.⁹ After Desert Storm, many senior Army leaders suggested including a RIPL in US (as opposed to just NATO) doctrine, to ensure the corps commanders had a sufficient voice in interdiction planning and targeting.

The collapse of the Soviet Union and the Warsaw Pact outdated FOFA, but AirLand Battle had a worldwide focus and applicability. AirLand Battle was not limited to an interdiction context, it addressed three distinct elements of the battlefield. These interrelated battles were rear, close in, and deep.¹⁰ AirLand Battle, then, expanded upon FOFA and included detailed discussion of deep battle. Four tenets summarize the basis of AirLand Battle doctrine:

- Initiative - to set or change the terms of battle by offensive action.
- Agility - the ability of friendly forces to act mentally and physically faster than the enemy.

- Depth - the extension of operations in space, time, and resources.
- Synchronization - the arrangement of battlefield activities in time, space, and purpose to produce maximum relative combat power at the decisive point.¹¹

That final tenet, synchronization, was meant to be more than a cliché. Subordinate commanders to the lowest levels were to have a continuous understanding of their commander's overall plan. They were also to make the fullest use of combined arms in a complementary manner.¹² No simple task, that comprehensive synchronization at all levels of Army command seems to imply direct control of supporting assets, like Air Force aircraft.

Striking Deep

The Army's interest in the area beyond the fire support coordination line would not have been as great if they had not fielded weapons systems that could easily reach that far. The AH-64 Apache attack helicopter, first operational in 1986,¹³ had the range and payload to interdict deep beyond enemy lines. Its avionics allowed it to do so at night, under adverse weather, when Air Force fighters might not be able to do the job. The Apache was designed primarily to destroy enemy armor with up to 16 Hellfire missiles and a 30mm chain gun. Laser-guided Hellfires home on designations from the firing chopper, a ground team, or other helicopters.

The Army Helicopter Improvement Program (AHIP) yielded a complementary system, the OH-58D. The OH-58D used a mast-mounted sensor package over its rotor to locate and designate targets for the Apache crews, while hovering behind the protective cover of terrain features. In addition to finding and designating targets for the Apache, OH-58D crews could work with laser-guided artillery and Air Force weapons.¹⁴

Army aviation was not the only competition facing the Air Force in the interdiction arena. In a sense, artillery is returning to its roots with increased range and capability.

The six rifled Parrott guns on the Federal side could fire into the flank of the Confederates and effectively cut off any reinforcement. In fact, because of their range and the advantage of height, they were able to cover most of the open area between the two Round Tops and the main Confederate line. The Rebels tried desperately to reach the top of the hill and put the battery out of action. They succeeded in killing the battery commander, but the guns continued to blast away at every rock-bound pocket of gray uniforms. The crimson battery guidon hung limp in the July heat, but every proud cannoneer knew its gold letters said, "Battery D, 5th Artillery Regiment--Alexander Hamilton's Battery."¹⁵

The above sounds very much like interdiction, but after Kitty Hawk the airplane supplanted artillery as *the* long range weapon. (Note: This study will not address tactical or strategic missiles, except for ATACMS, nor will it cover the role of nuclear weapons except as an interdiction target.) Armies developed some long-range weapons such as Big Bertha cannons and V-1 rockets, but they existed in limited numbers and generally were not intended to affect an ongoing land battle. Through Vietnam, most artillery still had a comparatively limited range.

The 1970s and 1980s included many advances in field artillery, such as the new multiple launch rocket system (MLRS). Fielded in 1983 and first envisioned for counter-battery fire and suppression of enemy air defenses, MLRS will eventually evolve into the U.S. Army's primary artillery weapon. Mounted on a tracked vehicle, each MLRS launcher had nine rocket tubes to fire up to 30 kilometers. The each rocket carried a CBU-like warhead with 688 bomblets of various types, most common of which is dual-purpose improved conventional munition (DPICM). DPICM bomblets function as a shaped charge against hard targets, or as antipersonnel rounds. Some MLRS rounds feature terminal guidance for precise attacks. Different launchers of the same battery can target different areas to give superb wide-area coverage.¹⁶

A typical division artillery battalion might have one MLRS battery of nine launchers, while a corps artillery may have two MLRS battalions. Those battalions would each have 27 launchers, a very impressive deep capability. As Desert Storm approached, the Army began fielding the Army tactical missile system (ATACMS). ATACMS used the basic MLRS launch platform with half the number of rockets, firing out to 150 kilometers.¹⁷

Conventional artillery range and accuracy have improved dramatically as well. Traditional ballistic 155mm projectiles can reach over 18 kilometers, while rocket-assisted rounds range over 30 kilometers. The 105mm howitzers of light infantry divisions can fire over 11 kilometers, compared to 18 kilometers for World War II Long Tom 105mms.¹⁸ Those are impressive ranges, and should lead a reader to ask why the Army would need to shoot so deep. Is it to seize the initiative in an AirLand Battle sense, or was MLRS an answer to Warsaw Pact numerical superiority? What drives pushing the ranges out even further with MLRS and ATACMS?

Figure 4-1 reveals a possible answer, one a fighter pilot can easily understand and appreciate. Soviet-developed systems, depicted in the top half of the chart, out-range US systems, especially before MLRS. The Soviets and other potential adversaries had numerical superiority. In an artillery sense, "getting inside the enemy's decision cycle" meant shooting him before he shot you.¹⁹ That disadvantage explains corps and subordinate commander reluctance to relinquish any control over deep battle assets or artillery-busting interdiction. It is difficult to have the initiative under an enemy barrage.



warfare. "In general, it (interdiction) is most effective when the enemy is under pressure from hostile action or because his own plans demand mobility."²¹

Colonel Warden addressed interdiction in further detail, describing three categories. *Distant* interdiction attacked the source of men or materiel, such as industry. *Intermediate* interdiction was anywhere between the source and the front lines, and *close* interdiction attacked targets near the front where lateral movement occurred between enemy units.²² There is nothing extraordinarily revolutionary in *The Air Campaign*, but its author's role in Desert Storm vaulted him to the center of Air Force-Army disagreements.

Kill Me, Please!

During the 1970s and 1980s, both services developed new weapons and revised doctrine and much better training programs, but one basic combat preparation problem remained. Termed *kill removal* in the Air Force, it is the process of eliminating participants from a training exercise who have been, at least theoretically, killed. In Air Force exercises, the dead are determined by special instrumentation systems or a radio call describing the victim. For example, "Guns kill Viper slicing left over the farms," describes a claim against an F-16 in a certain geographic area doing a descending left-hand turn. The deceased then depart the battle, sometimes for the remainder of the exercise. Other times, they "regenerate" after a given amount of time, usually while holding in a mort locker. The mort locker is an area where the dead hold until they can reenter the fight. Claims by surface-to-air systems are relayed by ground stations, or addressed in mission debriefs. When a kill cannot be passed real-time, but is discovered or addressed in debrief, all subsequent actions of the victim are discounted so they do not color outcome or lessons learned. Accurate and timely kill removal is a critical part of Air Force training, whether the missions involve two or two hundred aircraft.²³

Army training exercises use kill removal as well. The most important development in that area has been the multi-integrated laser equipment system (MILES). MILES used laser to document kills by setting off audio and visual indicators when a soldier, vehicle, or weapon system struck and taken out of the fight. The National Training Center (NTC) at Fort Irwin, California uses an extensive MILES network for realistic training, as does the Army training facility at Hoenfels, Germany. Although the NTC has used MILES since its inception for ground systems and personnel, it is still unable to use the system on Air Force aircraft. The difficulty in incorporating MILES on jets is partly technical, but the Air Force also has concerns about the realism of using a laser for score. Such a system ignored the complex ballistics of shooting down an airplane moving in three dimensions. Some of the opposing force helicopters do carry MILES. Even Air Force air liaison officers (ALOs) have trouble with MILES. Their high-frequency radios often set the equipment off, so they frequently disable MILES gear.²⁴

In classroom and laboratory exercises, or without a scoring system, computers often calculate attrition. The models are built meticulously to accurately predict kills and losses. However, kill removal is not always allowed to take its toll. Even with MILES, exercise

controllers often limit kills from indirect fire such as air and artillery to ensure that an armor or infantry battle actually occurs. Apache helicopters seldom get full credit, because there may not be a battle left to fight. This common tendency reinforces the Army perception that air power has little ability to affect the course of battle unless they control it directly, and they can, preferably, can see its results. Training scale is another problem in demonstrating indirect fire effects. NTC operates almost exclusively at the brigade level, so corps artillery, aviation, and Air Force interdiction seldom enter the equation.²⁵

Warming Up for the Big One

Five varied experiences shaped military and civilian attitudes immediately before the Persian Gulf war. Few remember the first as Operation Eagle Claw. It is most often referred to by the name of the place it turned from rescue to debacle, Desert One. In late April 1980, Eagle Claw forces were attempting to rescue American hostages in Iran. After maintenance problems dictated a mission abort, a helicopter and a C-130 collided, killing eight and injuring five.²⁶ Eagle Claw did not include interdiction operations, but the mission's failure and the ensuing tragedy highlighted joint coordination, training, and execution problems.

A combined Navy and Air Force strike on Libya 15 April 1986 provided the next proving grounds for joint operations. Again, interdiction was not an explicit goal of the El Dorado Canyon operation. One may argue that interdiction was implied; by striking key resources, President Ronald Reagan hoped to disrupt and divert the terrorist activities Libyan leader Colonel Qaddafi underwrote. El Dorado Canyon reemphasized the role of force packaging, with tankers, air superiority, electronic combat, and defense suppression aircraft supporting the striking F-111s and F/A-18s. The attacks hit an encampment and military aircraft with precision munitions and CBU's.²⁷ These attacks demonstrated not only American resolve to counter terrorism, they also displayed the emerging capability to strike heavily defended targets precisely *at night*.

Two hundred forty-one US Marines and sailors died at the hands of terrorists in Lebanon after a 23 October 1983 bombing. The attack had little to do with interdiction, but had bearing on the execution of Desert Storm. In Lebanon, the Marines' mission was unclear, and the political environment prevented the application of proper military tactics. This appalling tragedy sensitized the public not only to large casualties, but also to setting proper military objectives before committing American forces to a mission.²⁸

Just two days after the bombing in Lebanon, President Reagan called on a joint force to rescue American civilians in Grenada. Although the operation was successful, it was far from flawless. All four military services insisted on a piece of the action, creating a cumbersome command and control structure for a relatively small operation. Army and Air Force troops were victims of friendly Navy fire, and coordination left a great deal to be desired. In one extreme case, an American officer had to use a long-distance credit card to call for reinforcements!²⁹

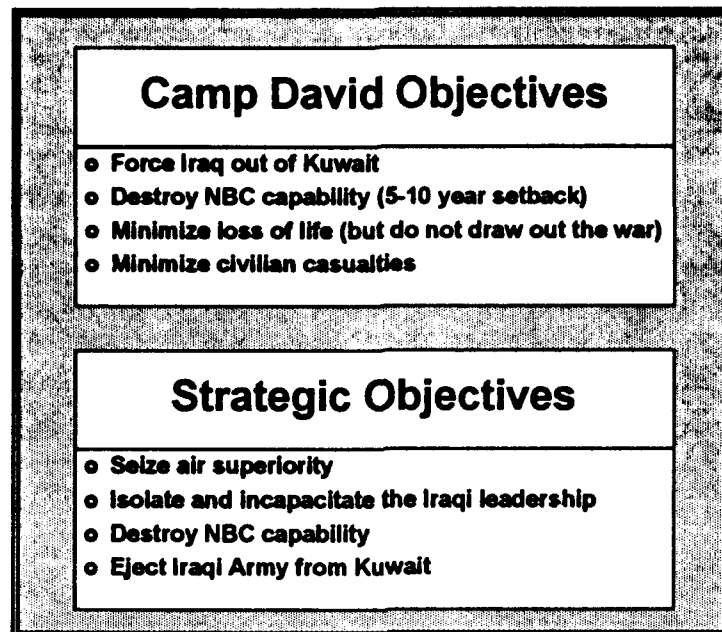
Operation Just Cause, the December 1989 invasion of Panama and subsequent arrest of Gen Manuel Noriega, served as a final warm-up for Desert Storm. The services worked relatively well together in Panama, applying many of the earlier lessons learned.³⁰ The Panamanian Defense Force offered no air opposition to speak of, but Operation Urgent Fury marked the public debut of an important interdiction weapon, the F-117A Nighthawk. Lt Gen Carl Stiner, commander of XVIIIth Corps and designated to lead Joint Task Force South, selected the target for two F-117As. They were to drop 2,000-pound bombs *near* a PDF barracks to disorient the Panamanian defenders. One F-117A pilot missed the mark considerably, but the attack had the desired effect.³¹

That interesting sidelight is relevant for two reasons. The first is quite obviously the emergence of an impressive new weapon system. The less apparent but possibly more important is the light the strike put on the increasingly diverse and complex nature of interdiction. That strike met the basic criteria of *indirect interdiction*. General Stiner wanted to delay, disrupt, and divert enemy forces before they could be brought to bear on friendly troops. For political reasons, he did not want to destroy them, and used the F-117A's precision to reconcile that consideration. In low intensity conflict, and any time friendly or enemy casualties are a major concern, such indirect interdiction may become more prevalent.

Desert Storm

The stage was set for Desert Storm. A modernized American military, with practice in joint operations, faced a large, Soviet-equipped enemy. After nearly two decades of improved training, how would they fare in battle? Would they avoid the stagnation of Vietnam? Would an air campaign be enough to defeat the enemy while avoiding large loss of life? More directly relevant to this study, would interdiction and deep operations provide an effective synergy?

Figure 4-2 shows the original objectives. A Camp David meeting of President George Bush and key leaders (including Gen H. Norman Schwarzkopf and Lt Gen Charles Horner) produced the first set. The Air Force planners developed the strategic goals using the first set of objectives, plus direction from General Schwarzkopf.³²



Source: Lewis, 2-3.

Figure 4-2. Desert Storm Objectives

The United States responded to Iraq's invasion of Kuwait with a large deployment of air and land forces to the Central Command area of responsibility. Shortly after the deployments began, the Air Force Headquarters (Air Staff) answered a request from the commander-in-chief, Central Command (General Schwarzkopf) and formulated Operation Instant Thunder. This plan served as the springboard for a more elaborate air campaign plan. The air side of what was to become Desert Storm sought to take advantage of friendly strengths and enemy vulnerabilities. Key factors in the coalition's favor included aircrew training, advanced technology, command and control, and true night capability. The Iraqis, it was believed, would be handicapped by inflexible command and control and their defensive posture. The plan sought early air superiority and immediate paralysis of the Iraqi leadership and command structure. Other concerns included Iraqi weapons of mass destruction and the Republican Guard divisions. The four-phase coalition game plan included the Strategic Air Campaign mentioned above, defense suppression in the Kuwait theater of operations (KTO), Phase III air attacks against Iraqi ground forces, and finally the ground campaign to liberate Kuwait.³³

Instant Thunder

The Air Force component, US Air Force Central Command (CENTAF) started planning for the air campaign against Iraq on 3 August 1990 after the secretary of defense asked for an offensive alternative to counter further aggression or other unacceptable behavior by Saddam Hussein. On 8 August, commander in chief, Central Command

(CINCCENT) requested Air Staff assistance in developing an offensive air campaign plan directed exclusively against strategic targets in Iraq because of the workload the deployed CENTAF staff faced with the arrival and beddown of forces.³⁴

The deputy director of plans for warfighting concepts happened to be Col John Warden. Colonel Warden briefed CINCCENT on the Air Staff proposal, labeled Instant Thunder. The name was selected to focus planners on the flaws of Rolling Thunder and ensure they avoided past mistakes. Navy, Army, and Marine Corps members joined the planning group as detailed planning commenced under the authority of the U.S. Joint Staff. By 25 August, the group had laid down the basics of Operation Desert Storm. The initial air attacks were to destroy 84 strategic targets in Iraq in a single week and paralyze Iraqi leadership, degrade their military capabilities, and neutralize their will to fight. As the planning continued in detail, Generals Powell and Schwarzkopf expressed concern about an Iraqi ground offensive prior to the deployment of significant coalition ground units.³⁵

Air Objectives

The air campaign had five major objectives, three of which had air interdiction underpinnings. Attacks on leadership command facilities and electricity production facilities supporting military and military-related industrial systems were to isolate and incapacitate the Iraqi regime. Planners were, in essence, interdicting leadership itself before it could be brought to bear on friendly forces. Similarly, attacks on postulated weapons of mass destruction (nuclear, biological, or chemical) or their production means interdicted that dangerous capability. CENTAF planned strikes against military production and storage, Scud missiles and launchers, and naval facilities, for the same reason. Clearly the attacks against the Iraqi army and its mechanized equipment in Kuwait prior to the ground offensive were interdiction, as were missions against railroads and bridges connecting military forces to means of support.³⁶

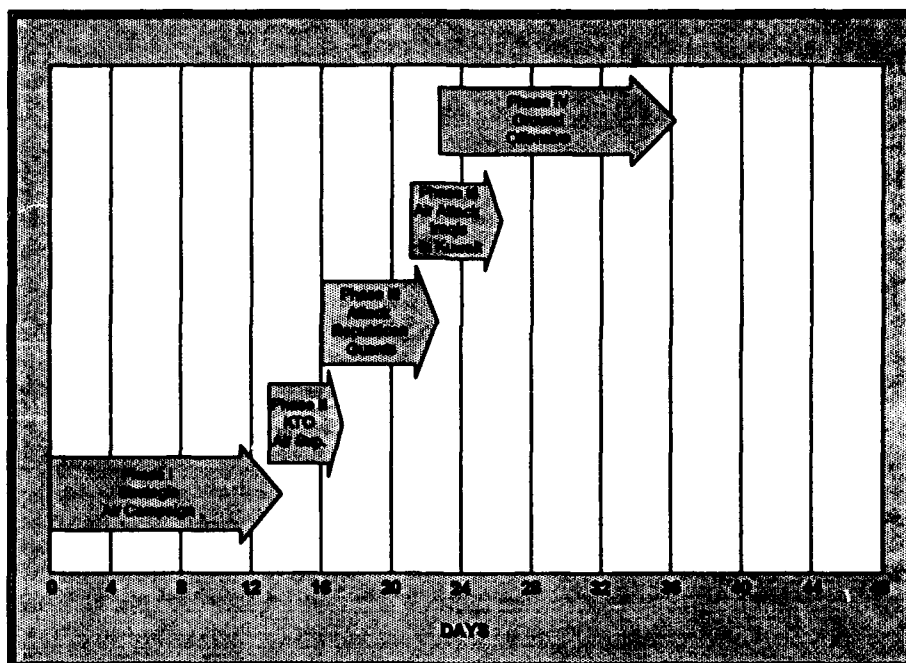
The sequencing of Desert Storm illustrated a common trait of air interdiction from World War I and World War II. Many contemporary definitions of air interdiction refer to preventing enemy forces from being brought to bear on friendly forces. Often, however, interdiction is fundamentally offensive rather than defensive. In the Normandy breakout, the rush to the Yalu, and Desert Storm, interdiction debilitated enemy forces before friendly ground forces were brought to bear on them. Did the lessons of history, as recorded in Air Force doctrine, guide the planners? According to Colonel Warden, that was not the case. With a group of 85 or so officers with a broad variety of backgrounds, Colonel Warden developed the campaign. When asked if he used AFM 1-1 or other doctrinal references, he responded, "No, because the doctrine was not relevant to war at that level."³⁷ The next version sought to remedy that shortfall.

The development of target sets and targeting priorities provided another example of doctrinal disconnects. The planners did not use conventional terms such as interdiction to describe their missions. Colonel Warden maintained the reason was that such categories were not relevant, and in some ways they were an impediment to good planning. The

planners worked targets "inside-outside," beginning with the deepest, most strategic targets in Iraq such as the enemy air force headquarters. Conceptually, targeteers' last target was the enemy army in Kuwait. Traditional mission labels were unimportant in building the plan. Unfortunately the Tactical Air Control center had to use them in building the air tasking order.³⁸

The Kickoff

"Iraq has won the toss, and elected to receive." The months of planning and preparation came to fruition 17 January 1991 over Iraq. Joint helicopter operations struck air defense radars, Tomahawk land attack missiles (TLAM) hit key installations deep in Iraq, as did F-117s. Phase I, the Strategic Air Campaign, had started. Figure 4-3 shows the original phases of the theater campaign, set on 12 October 1990.



Source: Lewis, 4.

Figure 4-3. Original Campaign Plan

Early success allowed the first three phases of the campaign to be conducted almost simultaneously, but bad weather delayed the strategic air campaign's completion. Nonetheless, the effort struck precisely and almost simultaneously at what planners had labeled the enemy centers of gravity. Air power effectively degraded Iraqi battle management, reduced military production, and quickly took the Iraqi Air Force out of the fight.³⁹

As the weather delayed the strategic campaign, pressure from General Schwarzkopf and the Army accelerated the shift to Phase III and battlefield preparation as the priority effort. Against the advice of the JFACC's principal deputy, Brig Gen Buster Glosson, CINCENT shifted so rapidly to battlefield preparation that by the fifth day of the war, over 50 percent of the air effort was so engaged. The only concession to General Glosson's concerns about the strategic air effort was to dedicate all F-15Es, F-111Fs, and F-117s to that role.⁴⁰

Scud missiles threw another wrench in the works. After the first Scud attacks, the missiles and their launchers became a high-priority target. This sapped more of the interdiction assets. Many of the Scuds were mobile and difficult to locate, forcing a patrol approach. F-15Es stood airborne alert, waiting for a Scud firing or other indicator of a launcher, then attempted to strike them before they could move. The results in this area were less than satisfactory.⁴¹

Even with the limitations on the strategic campaign, it succeeded in achieving the first and third of the strategic objectives in fig. 4-2. The combined air and ground effort against the Iraqi Army achieved the fourth, leaving only the third in doubt. Did the strategic air campaign "destroy Iraqi NBC (nuclear, biological, chemical) capability"? While Iraq did not employ such weapons, that may have been a strategic decision rather than a tactical defeat. Further, it is not clear whether or not the coalition forces achieved the Camp David object of destroying that capability for 5-10 years. Some evidence indicates much of the nuclear material escaped the attack.⁴² General Schwarzkopf made the call on shifting the air effort, as the joint force commander is expected to.

Desert Storm Battlefield Preparation

The CINCENT's theater campaign plan made strategic target elimination and attrition of Iraqi combat effectiveness in the KTO prerequisites for the ground offensive, but later added other priorities. The additional priorities included the enemy's air defenses, and Scud missile facilities and mobile launchers.⁴³ The Scud threat provided a new variation on the interdiction theme, a difficult target to find and strike that threatened very deep targets. Although the Iraqis used it as a terror weapon, a more sophisticated enemy with a greater number of missiles will significantly complicate interdiction targeting.

With the established 50-percent rule for kicking off the ground war, battlefield preparation took on special meaning in Desert Storm. Demonstrating the proper role of a joint force commander, CINCENT (General Schwarzkopf) set the priorities for aerial battlefield preparation. He took inputs from the ground commanders and the JFACC, but General Schwarzkopf synchronized them with the joint operations plan. A quote from the DOD report to Congress reveals subordinate Army commanders' reservations:

Ground tactical commanders found this discomforting, since they were most concerned about the forces immediately to their front and had only limited information on how CINCENT was using air power to shape the entire theater. Additionally, by

CINCCENT direction, air operations did not initially emphasize destruction of front line Iraqi forces in the KTO until just before the ground offensive.⁴⁴

Some reports dispute that view, saying that CINCCENT either relented to his US Army Forces, Central Command (ARCENT) and corps commanders or elected on his own to shift to KTO targets earlier than planned or appropriate. General Glosson complained to Schwarzkopf about an early shift into Phase III operations against Iraqi forces.⁴⁵ Despite the complaints from both sides of the issue, it appears CINCCENT filled the JFC role as intended, reconciling component concerns to meet the overall campaign objectives. One might question his decisions, but not that he was the appropriate person to make them.

During the battlefield preparation phase, over 35,000 sorties attacked KTO targets, with over 5,600 going against the Republican Guards. The components nominated targets, but CINCCENT apportioned sorties, and the JFACC tasked them. Artillery, command posts, command and control facilities, and enemy armor were hit repeatedly. The percentage of sorties allocated to battlefield preparation increased as the start of the ground war approached.⁴⁶

In the eastern portion of the KTO, the Marines placed priority on locating and destroying enemy artillery, armor, and troops in the central and southern parts of Kuwait.⁴⁷ The USMC leaders withheld the majority of Marine aviation from the JFACC tasking process, and their results were not as good as in the ARCENT AOR. General Glosson warned General Schwarzkopf that the Marines were not achieving the necessary attrition and suggested shifting more Air Force effort to their sector. Schwarzkopf told him to wait until the Marines requested help.⁴⁸

The DOD report to Congress reinforces the earlier contention on the influence of enemy artillery on deep battle:

Iraqi artillery was a primary objective in the battlefield preparation. Iraqi artillery, modern by any standard, often *out-ranged* (italics added) Coalition guns, and had been effective in the Iran-Iraq war. While the Coalition could hold Iraqi maneuver forces in position; left unchecked, Iraqi artillery alone might disrupt the Coalition ground assault. Properly used, enemy artillery could have delayed breaching operations long enough for some Iraqi units to counterattack. Additionally, there was a real concern that Iraqi commanders might use artillery-delivered chemical weapons. Accordingly, Iraqi artillery, particularly their most modern systems, were high priority targets during phase III of the theater campaign.⁴⁹

It appears that the focus of land operations at or below corps level remains a small segment of the overall theater, limited in both space and time. The nature of Army deep battle interest is, in large measure, fundamentally reactive and defensive. It is based primarily upon the reach of enemy fires and sensors.

Once the ground war started, Desert Storm provided a classic example of air interdiction. This study has noted many instances where interdiction was especially effective against a retreating enemy. The Highway of Death, running from Kuwait City to Basra in southeastern Iraq provided a chilling example. As the Iraqi forces executed the mother of all retreats, Joint STARS (discussed later in this chapter) located their convoys

at night. Striking first at night, and into the day, the coalition destroyed armor and other vehicles, and left a long-term imprint on Iraq's war-making potential.⁵⁰ It must be noted, however, that VIIth Corps complained that the FSCL limitations prevented a complete annihilation of the fleeing Iraqi forces.⁵¹

AirLand Battle Doctrine in the Desert

The AirLand Battle (ALB) doctrine developed to meet a Warsaw Pact threat provided the foundation for US Army Desert Storm ground combat Operations. The basic principles of initiative, depth, agility, synchronization, and combined arms guided planners and operators of that barely 100-hour phase of the theater campaign.⁵² Some maintain that AirLand Battle doctrine and ground combat concerns were too great a consideration, and took precedence too early in the air campaign.

The other ground components, US Marine and coalition forces, had their own doctrine, but AirLand Battle doctrine provided the conceptual engine for all ground combat operations. The final DOD report to Congress describes how AirLand Battle had evolved from FOFA and an early European focus, and acknowledges:

This doctrine places tremendous demands on combat leaders. Commanders must fight concurrently what are known as close, deep, and rear operations, all as interrelated parts of one battle. Commanders fight close—to destroy enemy forces where the battle is joined. They fight deep—to delay or attack enemy reserves. These operations are intended to disrupt the enemy's plan and create opportunities for success in close operations.⁵³

The final report revealed a major contradiction in ALB. While noting that the doctrine was the basis for all ARCENT (US Army) operations, the document also stated that it is centered "on the combined arms team, fully integrating the capabilities of all land, sea and air combat systems."⁵⁴ Does this mean that the Army commanders must have a measure of control of all elements of the combined arms team across the breadth and depth of the battlefield in order to rapidly shift and concentrate decisive combat power wherever needed? Or does this mean anytime US Army forces are involved, the joint force commander must be Army to successfully apply AirLand Battle?

The Army divisions in Desert Storm had three maneuver brigades, an aviation brigade, and an artillery brigade to provide offensive combat power. The ground situation was complicated by the presence of Special Operations Forces (SOF) including Army Special Forces, Army Special Operations Aviation units, Navy SEALs and Special Boat units, and Air Force special operations squadrons and combat control teams (CCT). A Joint Special Operations Task Force controlled reconnaissance, special reconnaissance (SR), and direct action operations to support battlefield preparation.⁵⁵ Synchronizing SOF operations, while not the topic of this study, proved quite difficult. The SOF liaisons were the last to join the JFACC staff, they were unfamiliar with air tasking methodology, and requested support late in the tasking cycle, requiring excessive air tasking order changes.⁵⁶

This is a suitable place for a brief discussion of the air tasking order (ATO). It merits a detailed discussion, but many others have already undertaken that effort, as noted in the bibliography. The ATO is the "how" of air combat, assigning missions and targets to units, grouping force packages, deconflicting sorties, and coordinating support assets such as air refueling tankers.⁵⁷

The Army is often distressed by the term, "72-hour ATO cycle." While an ATO develops over a three-day period, the actual tasking cycle is approximately 34-36 hours from initial target nomination to execution. That does not necessarily mean that the order is firm at the 34-hour point; the final ATO actually reaches units approximately 11 hours before execution.⁵⁸

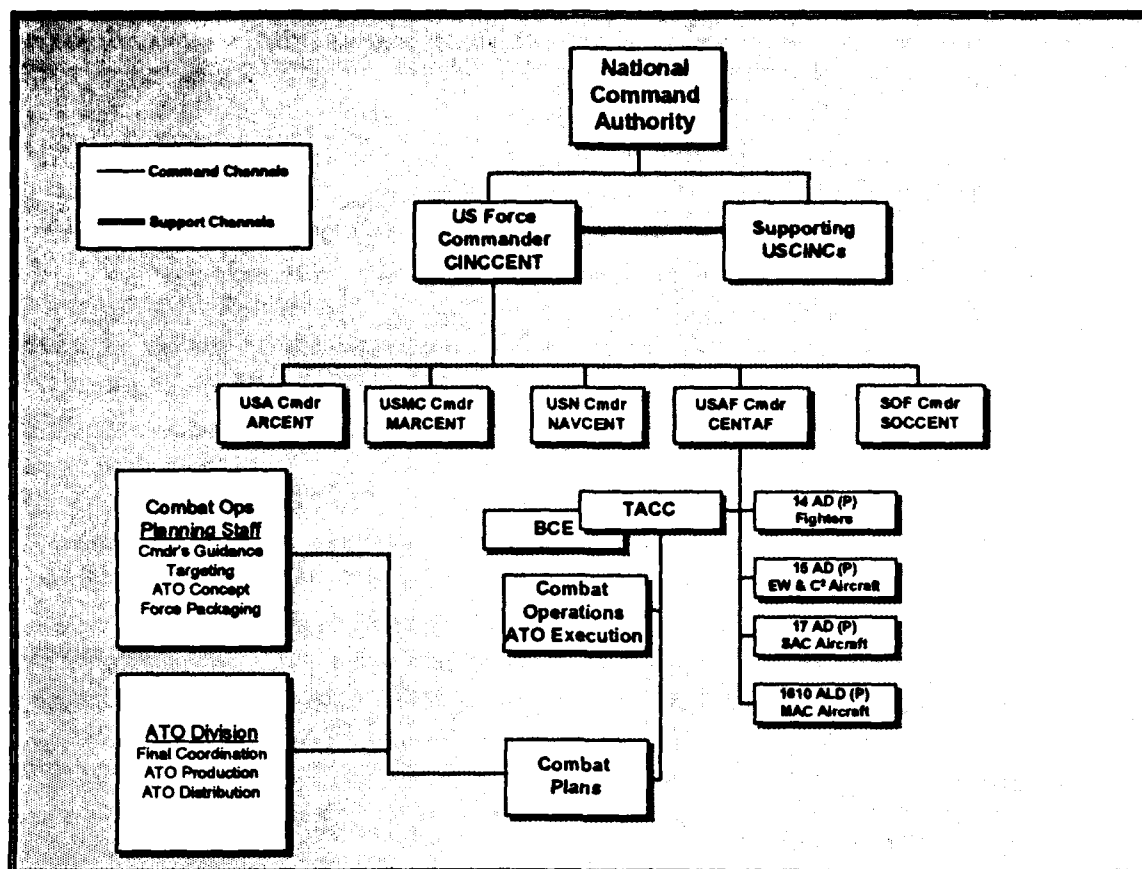
ATO changes degrade mission planning, and therefore results, but can be made if required. One of the most common Army complaints about Air Force management of interdiction is the ATO cycle and its limited flexibility. The Air Force has readily acknowledged the need for improvement, and there are several initiatives underway to produce a better order and to speed dissemination.⁵⁹ The ATO is essential for synchronizing aerospace operations.

Beyond the problems of synchronizing the operations of one nation's armed forces, the war included coalition forces from more than 23 nations. The accompanying differences in doctrine, language, customs, religion, equipment, and capabilities may be typical of future US military action as part of an existing or ad hoc coalition.⁶⁰

Command Relationships

The Air Force officers who developed the air campaign plan were determined from the outset to ensure that the concepts of centralized control and decentralized execution prevailed in the command and control structure for Desert Storm air operations.⁶¹ For the first time in a regional conflict, US forces applied the joint force air component commander (JFACC) concept in detail. Lieutenant General Horner, Ninth Air Force and CENTAF commander, fulfilled the JFACC and area air defense commander roles.

General Horner took the primary responsibility for planning and execution of all US and Coalition sorties to meet the theater objectives. Centralized control allowed a cohesive air effort, an amazing feat with over 2,700 Coalition aircraft from 14 different national or service components.⁶² His primary tools in the 43-day effort were the master attack plan (MAP, sometimes referred to as the master target list) and the ATO. Figure 4-4 shows the organizational structure in theater before a December 1990 reorganization of the tactical air control center (TACC) reorganization of its combat plans division.

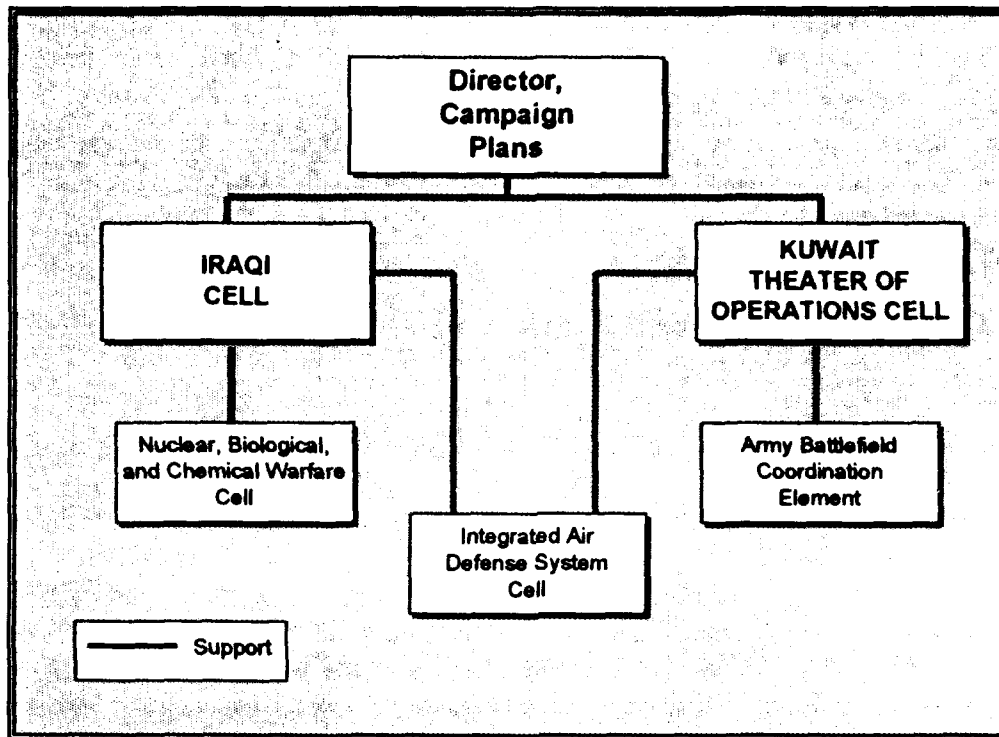


Sources: Multiple.

Figure 4-4. Desert Shield Organizational Structure

In December 1990, CENTAF Combat Plans reorganized to form Guidance, Apportionment, and Targeting (GAT). Figure 4-5 shows the relationships after the reorganization. The GAT's two entities focused on Iraq and Kuwait, but in reality one coordinated attacks deep in enemy territory, and the other, those closer to friendly troops. The Iraqi cell working the deep problem also incorporated the "black hole" personnel and activities.⁶³

The Army battlefield coordination element (BCE) served as the formal conduit for target nominations and other relevant coordination between the Air Force and Army. Army units nominated targets through BCE, informally, and the process was less direct. When sister-service (non-Air Force) liaisons to the JFACC staff briefed General Horner on their concerns and priorities, GAT staffers were there. The staffers got the scheme of fire and maneuver along with targeting priorities and relayed that information to the GAT targeters.⁶⁴



Source: ATO Preparation and Composite Force Packaging Briefing.

Figure 4-5. Guidance, Apportionment, and Targeting

This informal process worked because the people involved had generally worked together long before the war. Members of the Ninth Air Force staff and the 18th Airborne Corps had trained together many times; perhaps the most important exercise being a July 1990 CENTCOM exercise dubbed *Internal Look*. That exercise was doubly important, as it reinforced joint operations methodology *and* looked at an Iraqi scenario. The Ninth Air Force staff that formed the bulk of the CENTAF planners had barely unpacked when they deployed to Iraq for the real thing.⁶⁵

This habitual association proved very valuable and broke down many barriers. However, there were still disconnects between the Army and Air Force staffs. One of the problems stemmed from General Schwarzkopf's tendency to speak directly and informally to General Horner about targeting priorities. He would relay his concerns and General Horner would translate them into changes in targeting. The JFACC executed to meet the joint force commander's intent, just as the system was designed.

There were problems with these arrangements. ARCENT, Gen John Yeosock, was left out of the loop in many of these conversations.⁶⁶ The Iraqi targeting cell, and the Black Hole before it, were very "blue" (Air Force-dominated) organizations. The cell had joint advisors, but to the chagrin of some Army officers, General Glosson, as the JFACC director of campaign plans, clearly drove the train. This Air Force orientation was not

necessarily detrimental to joint interests, but the Army felt left out of the loop on the interdiction effort beyond the KTO, in direct conflict with AirLand Battle tenets. The Kuwait cell, on the other hand, was a very joint element.⁶⁷

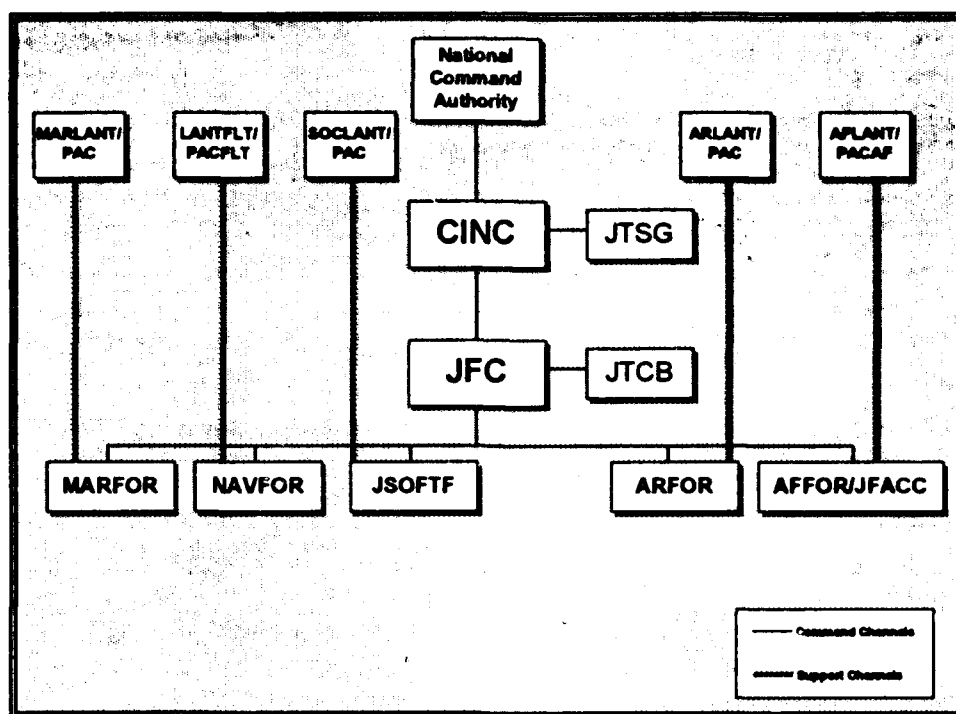
The other services, not just the Army, wanted CENTCOM, not CENTAF, oversight. This led to the establishment of a joint targeting board. Army Lt Gen Cal Waller, Schwarzkopf's deputy, became directly and routinely involved in the interdiction targeting process.⁶⁸

Joint Targeting Coordination Board

Demands for targeting oversight during and after Desert Storm led to institutionalizing the Joint Target Coordination Board (JTCB). These concerns were not limited to the Army complaints noted earlier. The Navy and Marine Corps both took issue with the possibility of an Air Force joint force air component commander for all theater air operations. They feared he would control all theater air operations and *not* support surface operations. In their view, the JFACC was "more like a coordinator."⁶⁹ It is difficult to understand why the JFACC's role would be so different from that of a land or naval component commander. All are given pieces of the puzzle to contribute, not to surface or air war, but to the joint force commander's overall campaign. Nonetheless, LANTCOM and PACOM have included a JTCB to differentiate air operations from other warfare elements as part of their JFACC concept of operations. The JTCB is chartered to resolve questions about targeting priorities and choices.⁷⁰

In the final USCINCPAC and USCINCLANT *JFACC Concept of Operations*, Joint Targeting Coordination Board (JTCB) and the Joint Targeting Steering Group are both above JFACC level, yet directly involved in interdiction targeting.⁷¹ Figure 4-6 shows the nominal organizational structure where the Air Force component commander (AFFOR) is the JFACC.

According to that document, key JFC staff members and a senior representative from each warfighting component will comprise the JTCB and conduct a daily review of progress in meeting the JFC's campaign objectives and priorities. In theory, the JTCB can provide "a macro-level view of the battlefield," presumably not available from the JFACC. In reality, its primary role is to reconcile conflicting component priorities.⁷²



Source: *JFACC Concept of Operations*, 3.

Figure 4-6. JTSG and JTCB

This concept of operations gave the JTCB an even more Draconian oversight role, charging it with monitoring Rules of Engagement and Laws of Armed Conflict compliance.⁷³ Remember that this direction stems from a document on air component commander operations. No such oversight exists for land, naval, or amphibious operations. Although those components might contribute to operations monitored by the JTCB, it is first and foremost an organization to keep an eye on the Air Force, apparently a service that simply cannot be trusted.

The need for this redundant oversight is even more puzzling considering that the JFACC is supported by a joint staff with personnel provided from each warfighting component. The joint nature of the JFACC staff is not limited to liaison elements from other services; augmentees are integrated into all JFACC areas.⁷⁴ Why have an integrated JFACC staff if another joint committee is going to oversee the operation? That redundancy is wasteful and perpetuates an atmosphere of suspicion.

One must assume the JTCB provides a capability that the existing elements of the joint command structure cannot. If the committee is to provide broad targeting guidance to the JFACC, the JFC must be unable to do so. If the JTCB has an operational level of war "focus," then the JFACC must not.⁷⁵

The controversial *JFACC Primer* summarized Air Force concerns about the role JTCBs, "Land and maritime component commanders would almost certainly object to

their 'scheme of maneuver' being altered by the JTCB; JFACC concerns for his 'concept of operations' are no different."⁷⁶ That statement goes to the heart of the matter. Although land, naval, and air combat have unique characteristics that give each capabilities and limitations, the principles of war should apply equally to all. Unity of command through a JFACC is just as important as the unity a land component commander provides. Diffusing that unity through committees is certain to reduce effectiveness. The JTCB will have that negative impact any time it takes a directive role in choosing targets or priorities. That action will either limit the JFACC's authority or duplicate it. In the first case the result is lost cohesion and focus, in the second it is chaos. The bottom line on committee warfare applies to all elements, not just air operations:

The complexity and speed of air operations argue against decision-making by committee. Committees tend to compromise in order to reach consensus. Committee processes inherently conflict with the military axioms of unity of effort, unity of command, and concentration on the mission and objective.⁷⁷

There is one area where JFACC operations differ significantly from land operations--continuity. The JFACC is directly involved in daily execution throughout a campaign. Interdiction is not the only area of involvement, the air component commander is also likely to serve as the area air defense commander and the airspace control authority. These are not "coordinator" roles, although coordination is a part of the duties. The JFACC provides unity of command throughout the course of the campaign. That contrasts sharply from the transitory involvement of surface forces. A division or corps may be in the line for only a number of days. The JFACC's continuous involvement gives him that operational focus.

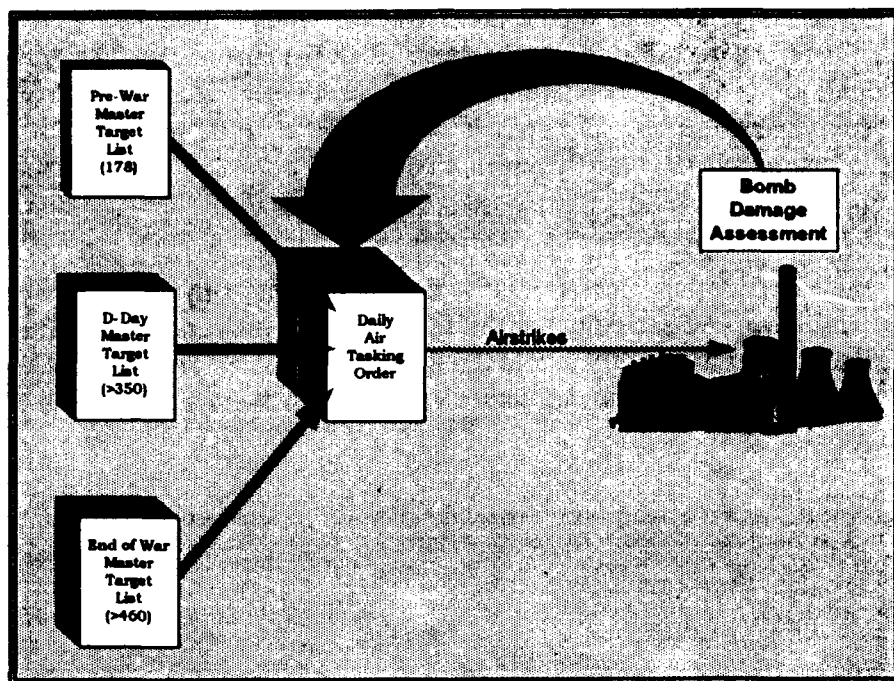
Are They Dead Yet?

If kill removal was difficult in peacetime, it proved even more troublesome in war. Clearly the target list developed from August 1990 to 16 January 1991 would not stay intact once the war began. One of the most difficult aspects of *all* deep fires is performance measurement. Have the fires had their desired effect, and if so, to what degree? This became especially troublesome in Desert Storm for several reasons.

The first reason was the 50 percent attrition prerequisite for the ground campaign. Additionally, the various purveyors of bomb damage assessment (BDA, also called battle damage assessment) could not agree on mission results. Before 17 January, the JFACC operations staff believed that pilot mission reports would be the primary means of assessment.⁷⁸ Beyond the ground component AORs, that was true without second-source reconnaissance. Even so, different units developed different standards for validation. In some, the aircrew assessment was enough, in other squadrons, supervisors required onboard video or film verification of pilot claims.

On the intelligence side of the Air Force house, intel officers expected to rely almost fully on second-source data. They put little or no credence to mission reports or onboard video from the strike aircraft.⁷⁹ That disconnect complicated JFACC ATO refinement.

Figure 4-7 describes the relatively closed-loop ATO process. While the target lists changed, to keep the ATO fresh, BDA results directly affected the following day's tasking order.



Sources: Multiple.

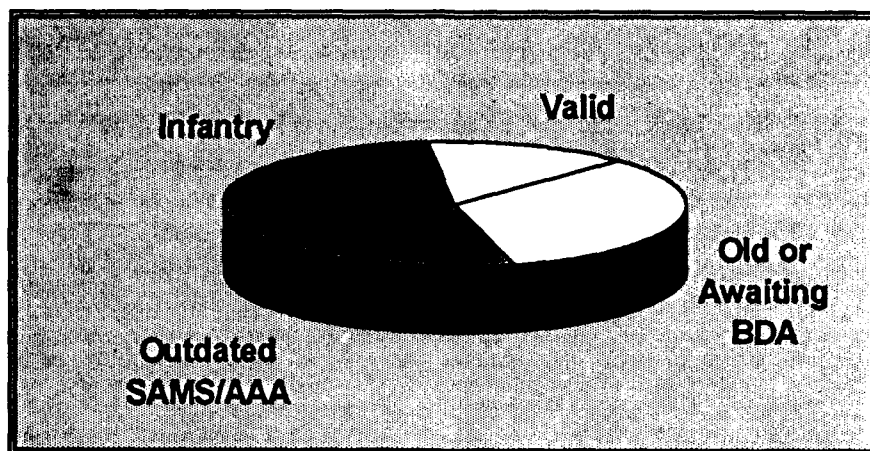
Figure 4-7. Target List and ATO Updating

Within the Kuwait Theater of Operations, BDA was critical to setting G-day. Problems with the intelligence BDA process in the KTO inspired General Schwarzkopf to authorize use of pilot reports as a valid BDA source, but ARCENT commander set the BDA rules. On 31 January 1991 General Yeosock briefed the Republican Guards as 99 percent effective, despite more than 4,500 F-16 and 360 B-52 sorties flown against three of the six divisions. It was not until 3 February that the JFACC staff discovered the cause for this pessimistic assessment. ARCENT had very restrictive BDA criteria, and accepted only A-10 pilot reports.⁸⁰

After the war, General Powell's *Doctrinal Statement on Selected Joint Operational Topics* addressed BDA (called battle damage assessment in that document), stating that component commanders suggest BDA priorities to the JTCB. Calling the BDA effort, "a joint program designed to determine if the required target effects are being achieved for each of the components, consistent with the Joint Force Commander's overall concept," the document then directs the JFC to apportion reconnaissance assets to support the BDA intelligence effort.⁸¹

Involving the JTCB in the battle or bomb damage assessment once again muddies the water and introduces bureaucracy and confusion. BDA in reality is the process of determining the effects of indirect fires--interdiction. The process should be more appropriately named interdiction damage assessment. As with the execution phase, the JFACC (from whatever service) should orchestrate the IDA effort, with a fully integrated JFACC staff to ensure the effort meets the needs of all the customers. The JFACC has the staff, communications, and preponderance of collection assets necessary to run this effort. If another component has special concern in the area of IDA, the JFACC can use an officer on his *integrated joint* staff from that concerned component to oversee the effort. There is simply no need to double the effort and the channels for communication and tasking.

Within the GAT during Desert Storm, the two services had an excellent working relationship and clear understanding of the BDA process and problems. There were no problems with "bean counting." Later in the conflict, the Army sent in some colonel-level supervision, very attuned to keeping score of how well the Air Force did at servicing Army-nominated targets.⁸²



Sources: Multiple.

Figure 4-8. VIIth Corps Target Nominations

Figure 4-8 shows the targets that VIIth Corps nominated on 31 January 1991. Only six of the 42 targets were valid. The others were inappropriate interdiction targets, were outdated, or had already been hit and were awaiting result assessment.⁸³ If the corps had control over the interdiction assets, valid targets would have been missed in favor of the corps nominations. Even so, after the war VIIth Corps officers complained about their lack of control:

The land components were then obviously faced with a no win situation. The FSCL had been located close to the FLOT (forward line of troops) to increase sorties against HPTs (high payoff targets), but as long as targets were over the FSCL, they would be included

in the theater AI campaign and the corps commander would get no sorties for his deep battle.⁸⁴

The preceding paragraph is a quote from an excellent paper presenting the US Army point of view on the FSCL and its role in coordinating and controlling fires. The paper is thorough, well documented, and well written. However, the above paragraph also highlights a major flaw in the Army's view of fire support. For the corps commanders to reap any benefit of sorties, it seems the sorties must fall under their control. From their perspective, those sorties included in the theater AI campaign do not serve his deep battle purposes. That logic is patently flawed.

There is an overriding motivation for coordination and control of fires and maneuver on the battlefield. The possibility of friendly fire casualties is real even in small operations, as Urgent Fury demonstrated. In operations on the Desert Storm scale, troop safety requires extensive measures, and safety concerns played in all operational planning. It proved impossible to prevent all casualties from friendly fires, given the speed of operations, lethality of weapons and the environmental conditions of Desert Storm. Extensive coordination and control measures, boundaries between units, phase lines to coordinate advances, fire support coordination lines (FSCL), and restricted fire lines were used.⁸⁵

Danger of fratricide against friendly ground forces is not the only reason for a fire support coordination line. It serves as a delineation between the primary interests of the land and air commanders.

A line established by the appropriate ground commander to insure coordination of fire not under his control but which may effect current tactical operations. The fire support coordination line is used to coordinate fires of air, ground or sea weapons systems using any type of ammunition against surface targets.⁸⁶

Some in the Army felt JFACC interpretation of the FSCL impeded fires and prevented the VIIth Corps from defeating fleeing Iraqi forces in detail. The situation presented a classic interdiction opportunity--VIIth Corps would attack the Republican Guards, ideally forcing a retreat. Then close air support, deep fires, attack helicopters, and air interdiction could complete their destruction. Again, the corps felt they should prosecute this effort, that the corps was the focus of the battle.⁸⁷ In reality, many of the fleeing Iraqi forces were subsequently hammered by air attacks between Kuwait City and Basrah.

Can the FSCL be an effective means of delineating areas of responsibility between the land component commander and the JFACC? The concept is quite simple, the land force or amphibious force commander establishes an FSCL, coordinating it with the JFACC and other supporting elements. The land or amphibious commander controls all fires short of the FSCL.⁸⁸ Not the local corps commander, the land or amphibious *component* commander.

The position of the fire support coordination line protects friendly forces and operations short of the line, based on estimates of the situation and concepts of the operation. The FSCL still lets land forces quickly attack targets of opportunity beyond the line so long as they inform other affected commanders in time to prevent friendly

casualties. The land commanders may, in "exceptional circumstances," attack targets beyond the FSCL.⁸⁹

After Desert Storm, Gen Colin Powell as chairman of the Joint Chiefs put priority on "activities impinging on and supporting the maneuver of all forces."⁹⁰ He directed that the services develop additional target nomination procedures, to allow land or naval force commanders to identify specific interdiction targets within their boundaries. This guidance does two things. First, it relegates interdiction to a purely supporting role as if interdiction were incapable of achieving objectives. Furthermore, it seems to imply that procedures for target nomination did not exist. General Schwarzkopf and General Yeosock both had direct influence on targeting, and even the corps commanders had a voice when they nominated valid targets.

The danger of specifying additional boundaries to the FSCL is that all such boundaries require frequent adjustment during the course of battle. Even if the supported land or naval commander is able to convey his scheme of maneuver operation to the JFACC, the additional delineation of areas will limit the JFACC's theaterwide perspective so important to a coherent, seamless interdiction effort.

Aircraft and Weapons

Technological developments after Vietnam played a major role in planning and execution of the Desert Storm air campaign. Precision munitions, especially laser-guided weapons, were refined in the interim. Early in Desert Shield, the availability of aircraft to deliver those weapons without external laser designation was a concern. Less than 75 long-range aircraft with that capability were initially available. Further deployments of F-111Fs and F-15Es increased the number to over 200 by the time the war began.⁹¹

F-117 was the media and military star of Desert Storm. Using its radar-evading ability, Nighthawk pilots were the only ones to routinely bomb key targets in Baghdad. While attacking the most heavily defended areas, they did not sustain any battle damage, truly an amazing feat. Their weapons accuracy was superb, accounting for 95 percent of all targets in Baghdad. The Nighthawk pilots precisely hit command bunkers and hardened aircraft shelters with impunity.⁹²

The F-15E's long range, high payload, and LANTIRN system made it an important interdiction weapon as well. Strike Eagles used LANTIRN navigation and targeting pods to strike mobile Scud launchers and for precise tank killing at night. F-111s used a similar infrared system, known as Pave Tack, and blew up an oil pumping station to stop an ecological disaster. That was truly a revolutionary interdiction mission.⁹³

F-16 performance in Desert Storm was generally disappointing, not because of an inherent shortfall in the aircraft. With a continuously computed impact point (CCIP) displayed in the pilot's HUD, they could drop unguided weapons with a 30- to 40-foot circular error probability (CEP), a vast improvement from the Vietnam war's 150- to 200-foot CEP.⁹⁴ However, when the F-16 dropped its ordnance primarily higher altitudes to

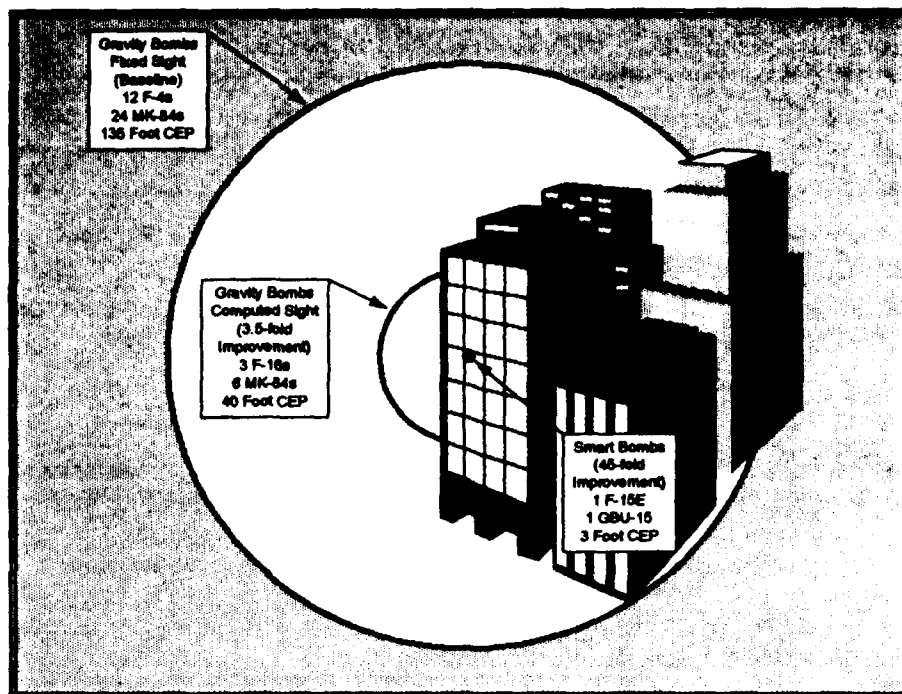
avoid ground fires, simple geometry gave a wider weapons dispersion. Additionally, target acquisition was more difficult from those altitudes. One bright spot in F-16 operations was the Killer-Scout teams using LANTIRN navigation pods to locate targets. This high-technology armed reconnaissance used designated "kill boxes" to delineate areas of responsibility for the Killer Scouts, who operated beyond the FSCL.⁹⁵

Joint surveillance target attack radar system's (JSTARS) first combat use was a dramatic success. The new system could identify moving targets with a moving target indicator (MTI) and pinpoint individual targets with its synthetic aperture radar (SAR). Joint STARS is a revolutionary interdiction and deep battle asset, giving commanders long-range eyes 24 hours a day regardless of weather and with little regard to terrain. That impressive capability introduces yet another quandary: who should manage Joint STARS?

During this war, Joint STARS was a theater asset, controlled by the joint force air component commander (JFACC). Because of the phased nature of the war with an air portion followed by a ground portion, the aircraft was able to service the vast majority of requests. Therefore, operational control was not a real problem. In the future, wars may not be so neatly divided. In that case, the Army may desire to give the corps commander authority to task the aircraft directly.⁹⁶

The global positioning system (GPS) proved invaluable for all coalition forces during the war, but especially so for interdiction and close air support. B-52s and F-16s used the system for general navigation and target location on interdiction sorties.⁹⁷

Desert Storm interdiction benefited from greatly improved weapons accuracy, shown in fig. 4-6. Colonel Warden admitted great surprise at the impact of precision munitions, having doubted their reliability and effectiveness in the past.⁹⁸ Improved accuracy is a blessing and a curse. The Air Force, able to strike more targets effectively with fewer sorties, must improve targeting processes to gain full advantage of the improvement. Additionally, bomb damage assessment resources are tasked even further as a greater number of targets must be analyzed for damage. Finally, a single precision weapon may leave a very small entry wound in the target, making its effects more difficult to measure.



Source: Air Combat Command Munitions Roadmap Briefing.

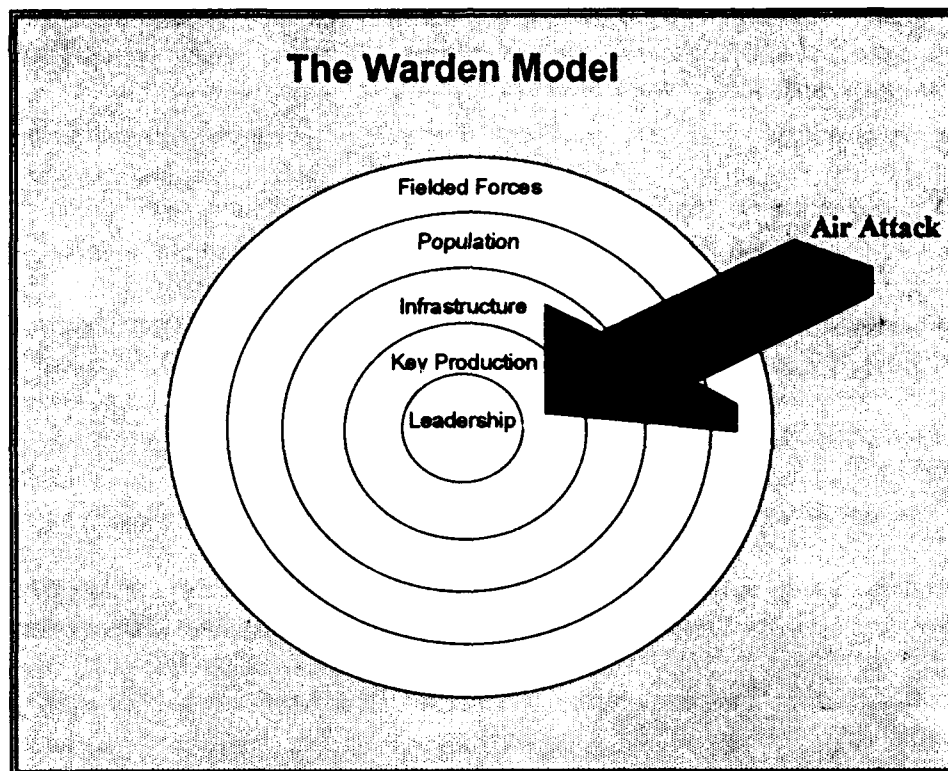
Figure 4-9. Improving Weapons Accuracy

The Gulf War Air Power Survey, an independent study commissioned by the Air Force, summarized the air effort noting that "Air operations destroyed a large part of the Iraqi Army, demoralized the rest and rendered it incapable of effective large scale operations." However, much of the Iraqi chemical weapons program, nuclear development program, and most of their mobile Scud launchers escaped destruction.⁹⁹ That is to say that tactical (corps) commanders' concerns drove the air effort *away* from the overall objectives. Can there be a more eloquent statement for an empowered JFACC providing unity of command over interdiction?

Aftermath of Victory

After the war, the Army and Air Force argued about which service facilitated victory, about who supports whom, and who should have responsibility for unity of command in the deep battle area. Despite the quick victory over Iraq, several factors complicated the discussions. The emergence of air power zealots alienated many Army leaders, and the fight for dwindling defense dollars upped the ante of the debate. The collapse of the Soviet Union muddled defense planning as the threat US forces might face became less predictable. Finally, the Clinton presidency brought a dramatically different view of defense and spurred further adjustments.

The US military was not content to rest on their Desert Storm success, and the period after the storm has proven one of the most tumultuous in the history of the American military. Air Force contributions to Desert Storm, shown worldwide on the Cable News Network (CNN), inspired a spate of "I told you so's" for air power advocates. Colonel Warden was at the front of the charge of officers and experts intent to show that air power was indeed as decisive as FM 100-20, *Command and Employment of Air Power*, had predicted nearly 50 years earlier. Colonel Warden hit the lecture circuit to advocate his concepts to a variety of audiences. In these lectures, he often used a simple model to show the advantage of air power over land combat forces, fig. 4-10.¹⁰⁰



Source: Interview.

Figure 4-10. Colonel Warden's Warfare Model

Colonel Warden maintained that the land campaign against Iraq may not have been necessary. He believed the air attacks had reduced the enemy's combat capability to near nil, and that it would have been just a matter of time before the Iraqi forces were compelled to withdraw from Kuwait.¹⁰¹ That argument, sure to irritate those who planned and executed the ground war, did have merit. Were the ground casualties necessary? What of the expense? Could air power win a war by itself? Interesting food for thought, but the real issue should be whether or not national objectives were met. Bickering over

service preeminence detracts from joint cooperation in support of those objectives. Furthermore, in most foreseeable circumstances a ground campaign will be necessary to defeat a large enemy army. Desert Storm provided the best possible environment for air attacks, with complete air supremacy and open desert terrain. As noted throughout this study, in a static ground combat situation, armies eventually find ways around supply interdiction. That may well have been true for the Iraqis.

Colonel Warden's influence increased after the war, and many cited his concepts. His use of five strategic rings (fig. 4-10) to visualize enemy vulnerabilities became a popular method.¹⁰² Leadership, key production, infrastructure, population, and fielded military forces as a means of inside out warfare does focus on the key considerations listed above. Further, these categories can be broken down into key subsets for analysis. For example, leadership may include both military and civilian elements. Key production can be elements of mass destruction capabilities.

There are problems with this approach. For one, it is overly simplistic, even when target categories are broken into subsets. Another is the implied priority of the "bull's-eye" presentation. Leadership is not always at the center of enemy capability. Fielded forces may be the enemy center of gravity, and leadership may be either relatively unimportant or invulnerable. Perhaps the most significant shortfall is that the five rings seem to disassociate land combat from aerospace warfare. While not intended that way,¹⁰³ many Army officers view Warden's ideas in that manner. Once the initial furor subsided, the argument settled on a more even keel and on familiar terrain. That terrain is the overlap between deep operations and air interdiction.

New Doctrine and the JFACC Primer

March 1992 brought a new Air Force Manual 1-1, *Basic Aerospace Doctrine of the United States Air Force*. Air Force Chief of Staff Gen Merrill A. McPeak labeled the two-volume set, "one of the most important documents ever published by the United States Air Forces."¹⁰⁴ The new version featured basic doctrine in the first volume, and a second book with writings to support the doctrine. The Air Force expanded on its institutional beliefs in the *JFACC Primer*. The Air Force deputy chief of staff, plans and operations, published this document in August 1992 as a "single source collection of the current thinking on joint operations."¹⁰⁵

The *JFACC Primer* appeared before General Powell's November 1992 doctrinal statement decreed that there is only one campaign. It devoted several pages to air campaign planning, centers of gravity, phasing of operations, and resources. It described a campaign plan that harmonizes the aerospace control, force application, and force enhancement roles and integrates the efforts of other services and components.¹⁰⁶

The desired scope of joint force air component commander oversight is one of the most important Air Force views expressed in the *JFACC Primer*. Acknowledging that the

other component's direct air support requirements, consistent with joint and service doctrine, the authors listed the assets routinely under JFACC control:

1. All USAF sorties.
2. Marine sorties for long-range interdiction, long-range reconnaissance and air defense.
3. Marine sorties in excess of MAGTF ground support requirements.
4. Naval air in excess of maritime air operations requirements.
5. **TLAM interdiction missions beyond the FSCL.** (Emphasis added.)
6. **Army Aviation and ATACMs interdiction missions beyond the FSCL.** (Emphasis added.)¹⁰⁷

The Air Force does not want an Air Force JFACC to manage Marine air in direct support of MAGTF ground forces, Naval air in direct support of maritime operations, Army air within the FSCL (with the possible exception of ATACMs), special operations air forces, or TLAM missions short of the FSCL. However, there may be circumstances where other component concerns directly conflict with the JFACC's, and the *Primer* recognized that in such a case the joint force commander, providing unity of command over the entire campaign, must be the one to make the tough choices.¹⁰⁸ A JFACC who is convinced he cannot accomplish his assigned missions with the available resources must so advise the JFC, but trade-off decisions belong to the JFC alone. That view seems consistent with joint doctrine and other service concerns.

Strategic Attack or Interdiction?

Both volumes of the new AFM 1-1 addressed Warden's notion of strategic attacks in considerable detail. Those attacks should produce effects "well beyond the proportion of effort expended" and are directed at the enemy's center of gravity. The centers of gravity could be command elements, war production assets, and supporting infrastructure.¹⁰⁹ Apparently, the difference between strategic attacks and interdiction is that the strategic attacks impact the entire war effort rather than just a single campaign or a single battle. Like interdiction, they are defined by their aim, not their means. There are two main problems with this concept. The first is a misapplication of the idea of center of gravity, and the second that the term "strategic attack" disconnects air warfare from other elements of a joint campaign and harkens back to daylight strategic bombing.

The new Air Force doctrine, like many other service writings after the war, paid a lot of attention to "centers of gravity." Carl von Clausewitz identified the *center* (singular) of gravity in *On War* in a discussion of the dominant characteristics of belligerents. He contended,

Out of these characteristics a certain center of gravity develops, the hub of all power and movement, on which everything depends. That is the point against which all our energies should be directed.¹¹⁰

While few military theorists believe most antagonists have a single point against which *all* energies should be directed, many seek a characteristic essential to an the enemy's success. However, when such points are considered in plural, they are no longer consistent with Clausewitz or the contemporary definition of center of gravity, as used in the physical sciences and mathematics:

The point in any solid where a single applied force could support it; the point where the mass of the object is equally balanced. The center of gravity is also called the center of mass. When a man on a ladder leans sideways so far that his center of gravity is no longer over his feet, he begins to fall.¹¹¹

The use of the plural "centers of gravity" is not consistent with the Clausewitzian or common definition of the term. Further, it serves to confuse the issues. If a target set, enemy capability, or weakness is the actual center of gravity, then it clearly is the *number one* priority target--if it can be attacked. Centers of gravity are usually critical target sets or key mission elements and should be labeled as such. The negative impact of the plural terminology has direct bearing on interdiction and deep battle as the Army and Air Force attempt to reconcile their priorities.

JFACC Primer also addressed center of gravity, claiming that "targeting priorities will be a function of enemy centers of gravity." The authors did acknowledge that the initial air attacks may not reach the real center of gravity, and may have hit other targets for defensive considerations.¹¹² The *Primer* went on to relate center(s) of gravity to another difficult topic, enemy will:

Key features of a center of gravity are its importance to the enemy's ability to wage war, its importance to the enemy's motivation and willingness to wage war, its importance to the enemy political body, population, and armed forces, and the enemy's consciousness of these factors. There may be several potential centers of gravity, each of which can have different degrees of vulnerability, effort required, immediacy of effects, lasting effects, and probability of results.¹¹³

The issue of will merits an entire study, but is worthy of mention here. There are several difficulties in addressing will, whether of the enemy or one's own forces and people. One of the greatest difficulties is determining the will-related military objectives. The idea of will may be clear at the strategic level, but it is very difficult to find target coordinates that communicate to an F-117 pilot the need to "compel the enemy to do our will."¹¹⁴ More importantly, attacks aimed at a nebulous enemy will may not serve the joint force commander's operational and tactical objectives very well. Air Force interest in destroying an enemy's will to fight, with roots in the writings of Giulio Douhet, color much of the discussion of strategic attacks.

Is there any basis for the interest? One may argue that it is more accurate to consider will of the ruling elite a valid military target. Whether the firebombing of German and Japanese cities, or the nuclear attacks on Hiroshima and Nagasaki destroyed the will of the people was relatively unimportant.¹¹⁵ Until Hitler submitted by suicide, and Emperor Hirohito chose to surrender, the attacks had not had their desired effect. To pursue

attacks directed against enemy will ensure results will be a long time coming and very difficult to measure.

Nonetheless, AFM 1-1, vol. 2, touted strategic attack as, "probably the most distinctive mission of aerospace power." While the writings of the 1920s, the bombing campaigns of World War II, and extended deterrence shaped the Air Force, that does not necessarily make them valid warfighting concepts for the 1990s. The authors went on to pay homage to the gods of daylight strategic bombing:

Strategic attack capabilities have also embodied the essence of independent air power: the ability to strike directly at the will and war-making capacity of the enemy unencumbered by surface military operations. Strategic attacks often comprise the most direct means available to force an enemy to cease fighting or to otherwise make decisions or concessions in line with friendly objectives.¹¹⁶

"Unencumbered by surface military operations" understandably worries Army readers that the Air Force wants to win wars *without regard* for surface forces. Alluding to the pre-World War II assertion that strategic attacks are unstoppable and therefore the objective of enemy capitulation has been seen as inevitable, the author then refuted that assertion:

The reality has proven to be somewhat more complex. Technology has made possible aerial bombardment of strategic targets across the globe, but historical results have rarely fulfilled early theoretical assertions. It has often been proposed, for example, that aerospace power can "win" a war by itself, but strategic attacks cannot be guaranteed to directly compel a desired enemy response. Strategic attack capabilities are only one of several tools available to those who wield the national military instrument, and each of these tools has particular scope, creates broad effects, and has limitations.¹¹⁷

With that recognition, is there a need to differentiate between strategic attack and other forms of interdiction? Air Force doctrine recognized that they can combine with other aerospace force application missions and with surface operations in a synergistic campaign, and gave examples where interdiction of war materials is much more effective when production facilities are attacked strategically, and that such interdiction is of little use if surface forces do not take advantage of the situation they present.¹¹⁸ Attacking production facilities, in reality, is simply interdiction further up the production chain. The most significant difference is the time required for the attacks to yield benefit. Generally, interdiction more removed from the battlefield is slower to take effect.

Is the broad impact of strategic attack significant enough to differentiate it from interdiction? It is not when the strategic attacks focus on the military outcome. Even though any adversary is likely to have strategic vulnerabilities susceptible to air attack those vulnerabilities must be relevant to the joint campaign and overriding objectives. The new Air Force doctrine claims that discerning those vulnerabilities, "is an airman's task."¹¹⁹ That may be so, especially with an empowered JFACC orchestrating an interdiction effort, but to do so does not require differentiating between mission categories. Differentiation may be important when the JFC has to make choices and set priorities, but that can be made by desired effect. Rather than choosing in a general sense between strategic attack and interdiction, the joint force commander should place priority on "isolating enemy

command and control" or "attriting artillery elements of the enemy's forward forces." Both are interdiction objectives, and their significance is effect, not geographic location. Geographic location is no longer important when it is determined that targets are far enough removed from friendly forces to be hit without close coordination.

What Is Interdiction?

All this begs the question, just what *is* interdiction? The study earlier addressed several definitions of interdiction, but the key characteristic is the desired effect. Delay, disrupt, divert, or destroy enemy military capability before it can be brought to bear on friendly forces—that is interdiction. Interdiction is a theaterwide effort. As Army corps commanders attempt to control the effects of all "deep fires" within their area of responsibility, they seek to constrain that theaterwide effort by confining it laterally within artificial boundaries. "Deep fires" is another name for interdiction, and that theaterwide effort requires unity of command to synchronize all assets. The joint force air component commander is organized, trained, and equipped for such theaterwide synchronization while a corps commander's focus is necessarily more limited.

Once again, the JFACC's management of interdiction is *not* a divorce from surface warfare objectives or the land campaign. "Interdiction and surface operations should be planned and executed to complement and reinforce each other. . . To achieve efficiencies and enhance effectiveness, the air component commander should control all forces performing interdiction and integrate interdiction with surface force operations to achieve the theater commander's objectives."¹²⁰

The expanded definition of interdiction mentioned in chapter 1 is significant because of its reference to the variety of interdiction means, but more for the last sentence of the definition: "The JFACC is the supported commander for the joint force commander's overall air interdiction efforts."¹²¹

The publication addresses synchronizing maneuver and interdiction in some detail. Calling such synchronization, "one of the most dynamic concepts available to the joint force," it maintains that the two are not separate operations, but complementary.¹²² That statement would seem to indicate that they are therefore always simultaneous and overlapping. That is not always the case, and was only the situation for a very small period of Desert Storm.

What of a situation where sufficient maneuver elements are not immediately available but air power is? In such a case, interdiction might pursue objectives that are separate from any ground objectives, but still complement and enable the joint force commander's *campaign* objectives.

When maneuver and interdiction are employed coincidentally, then it is true that their synchronization presents difficult dilemmas for the enemy. Exploitation is the obvious example; an enemy forced to retreat from effective maneuver forces is extremely vulnerable to interdiction as it moves. In any case, interdiction is not limited to a specific

region of the battlefield, "but generally is conducted forward of or at a distance from friendly forces."¹²³ That is one of two differences between CAS and interdiction--the requirement, due to proximity of friendly forces, for detailed coordination to prevent fratricide. The other significant difference is that interdiction's ability to achieve advantages at all levels of warfare.

As a guiding principle, Joint Force Commanders should exploit the flexibility inherent in joint force command relationships, joint targeting procedures, and other techniques to resolve the issues that can arise from the relationship between interdiction and maneuver. When maneuver is employed, Joint Force Commanders must carefully balance doctrinal imperatives that may be in tension, including the needs of the maneuver and the undesirability of fragmenting theater air assets.¹²⁴

Establishing yet another staff organization, the JTCB, does not "exploit the flexibility" of joint relationships; it detracts from it. The JFC must be able to make the tough calls, make them directly to his component commanders, and has every right to expect them to be implemented. If that is not the case, the problem is not the absence of a committee, it is an absence of leadership willing to step up to difficult issues.

General Powell's *Roles and Missions* provides a good, clear description of theater air interdiction:

The US relies on land- and sea-based attack aircraft, long range bombers, cruise missiles, and surface-to-surface missiles to conduct interdiction. Theater air interdiction (TAI) describes offensive aerial actions intended to attack enemy forces deep within their own territory before they can engage our forces.¹²⁵

This definition has three flaws. First, theater *air* interdiction conceptually limits the means of mission accomplishment, even though surface-to-surface missiles are specifically mentioned. Second, the definition should specifically include attack helicopter and artillery fires beyond the fire support coordination line as "theater interdiction." Finally, what does "deep within their own territory" mean? The geographic position of the enemy is important not in terms of ticks on a map, but in a chronological sense. How long will it be before those forces can be brought to bear on friendly surface forces? That phrase should be stricken from the definition.

What about CAS?

AFM 1-1, vol. 1, says, "Close air support is the application of aerospace forces in support of the land component commander's objectives."¹²⁶ That is a simplistic reference as almost any aerospace mission can support land component commander's objectives. There are several things that differentiate CAS from the other missions, however. The most significant is the requirement for close coordination, not just at the theater and component levels, but all the way to tactical execution.

That requirement helps make close air support perhaps the least efficient application of air power. Nonetheless, the Air Force recognizes that, "at times it may be the most critical by ensuring the success or survival of surface forces."¹²⁷

One quote from volume 1 indirectly alluded to the need for unity of command over close air support:

Close air support should create opportunities. Close air support should prepare the conditions for success or reinforce successful attacks of surface forces. Close air support can help create breakthroughs, cover retreats, and guard flanks. In effect, close air support can provide another maneuver element for employment in cooperation with surface combat elements. Close air support can be most effective at decisive point in a battle.¹²⁸

If all that is true, then the land commander should command provide unity of command over close support. Who else can be aware of the requirements, and understand the decisive points of a land battle?

The Army has for decades maintained that Air Force reluctance to do CAS reflects an institutional lack of interest in the land combat forces and their role. Consider how many things must go wrong, how many opportunities must be missed, for CAS to be necessary.

- Interdiction failed to divert or destroy the forces in contact with friendly ground troops.
- Friendly land component fire support (artillery, missiles, attack helicopters) prior to contact.
- Available land component fires are insufficient to meet the tactical situation.
- Ground elements do not have an adequate force ratio to handle the tactical problem with organic assets.

That, too, is something of an oversimplification. Close air support may be critical to blunt an enemy attack by forces already massed in close proximity to friendly troops, as they are near the Military Demarcation Line in Korea. However, anytime American forces have the initiative, and can dictate or at least influence the time and place the Air Force engages enemy surface units, CAS should be a clear second choice to interdiction. In those circumstances, a *requirement* for CAS represents failure to capitalize on the advantages US aerospace power offers

The Army Responds

The Army response to the Air Force afterglow included a great deal of attention to whether or not air power can be a decisive force in a theater campaign. Despite General Powell's comment that, "Air power was decisive in that war. It made the rest of what we had to do that much easier,"¹²⁹ the Army seemed to attack that contention at every turn. A letter to the editors of *The Air-Land-Sea Bulletin* summarized Army discontent, in this case with the content of *JFACC Primer*:

The primer violates the tone of Joint Pub 1 and significantly oversteps the authority of the Air Force to prescribe joint doctrine. . . . It does, however, clearly reflect the Air Force's lack of understanding of land operations and more specifically, their fixation on the FSCL as a battlefield boundary between land and air operations.¹³⁰

Are the charges correct? Did the Air Force attempt to prescribe doctrine in the *Primer*? Apparently the angry letter-writer did not elect to read the entire document.

JFACC Primer admonished Air Force readers that, given immense scope of joint doctrine review, the process is likely to result in some proposals individual service or area experts see as clearly flawed. Cautioning that such proposals may be contrary to lessons learned in war, the authors maintain, "It is important that all Air Force and other Service readers of this 'primer' have an understanding of these concerns."¹³¹ It would seem reasonable that the Air Force present its views on JFACC topics, and the *Primer* does not claim to be joint or doctrine.

The Army was dissatisfied with their voice in targeting interdiction during the Gulf War. As noted earlier, much of the unhappiness came from General Franks' VIIth Corps. Among the allegations:

The Air Force should not have been surprised by the Army's anger. In FM 100-15, *Corps Operations*, the authors state, "Normally, the corps fire support coordinator is the individual who is given the authority and responsibility by the corps commander to control all deep fires, to include tactical air and jamming operations." In the same section, the authors go on to call the area of operations "in which he controls all aspects of the battle, when a maneuver or aviation unit is committed."¹³² These telling quotations are the clearest reference to two commonly held Army views. The first is that land commanders must to *direct* air power employment in deep operations. The second belief is that areas of operations, and the airspace above them, must fall completely under the control of the ground commander.

After Desert Storm revealed that the Air Force did not release that control of air operations, the Army began a full court press to codify their view. The first volley was a proposal titled *Full Dimensional Operations*. The proposal addressed several areas of joint operations, but focused on targeting for and control of air interdiction. *Full Dimensional Operations* sought a more active role for the Army, delineated by areas of operation and of responsibility.¹³³ A draft revision of FM 100-5, *Operations*, covered the terms area of operations, area of interest, and battle space in much greater detail than the previous version.¹³⁴

This preliminary draft contains a telling section revealing true Army feelings about the potentially decisive nature of air power. In contrast to General Powell's view cited earlier, they maintain that in Desert Storm,

USCENTCOM conducted an extensive buildup coinciding with the use of air to shape the battlefield to ensure the right conditions for success in later operations. Subsequently, the combined efforts of a thirty-six nation coalition resulted in the defeat of the Iraqi armed forces in the space of 100 hours following the commencement of the ground war.¹³⁵

While the manual admits that operations will be joint and air power will contribute to decisive action, there is a continual implication that land combat units will achieve the aforementioned decisive victory. The land component and land warfare are continually presented as the focal points for combat operations.¹³⁶ In the same draft, a discussion of decisive points illustrates the Army view of land warfare's preeminence. "Thus, the seizure or retention of a decisive point will greatly influence the outcome of an action.

Decisive points are usually geographical in nature, such as a hill, a town, or a base of operations.¹³⁷

That difference highlights a basic fallacy in most American joint warfighting doctrine. Most doctrine assumes simultaneous air and land operations. In reality, air operations usually precede major ground efforts, and are more continuous throughout the war than ground combat. Doctrine that links the two elements of combat power continuously unnecessarily constrains air power.

Apportionment

A key process in determining the nature of air operations is apportionment. Apportionment is how the joint force commander determines an assignment of percentages and priorities of various types of air operations over a given period of time.¹³⁸ The apportionment process is intended to assist the JFC's direction of an air effort consistent with campaign phases and objectives, but it is an arbitrary and outdated process. The use of percentages inspires a numerical, bean-counting approach that leads supported forces to focus on whether or not they are getting their fair share of sorties, rather than if the air support is accomplishing desired missions. Apportionment is valid when the JFACC staff, during initial planning, attempts to determine capabilities on a long-term or daily basis. Apportionment by categories such as strategic attack, interdiction, counterair, maritime support, and close air support lose the focus of objectives.

Bottom-up apportionment is a necessary part of aerospace planning. Using a bottom-up approach, planners determine the capability of available forces. Some of that is driven by system limitations; A-10s are not going to do deep interdiction or offensive counter air sweeps, and F-15Cs are air superiority only. The next consideration is what has to be done (assigned missions) and in what priority.¹³⁹ From there the process is target-driven. The available targets are examined for applicability to the given missions, and as many as possible are struck on a given day. If the apportionment process begins at the top, the planning staff has to beat the ATO square peg into the apportionment round hole. To achieve a set percentage of a given mission category, sorties must be arbitrarily assigned to mission categories regardless of target value.

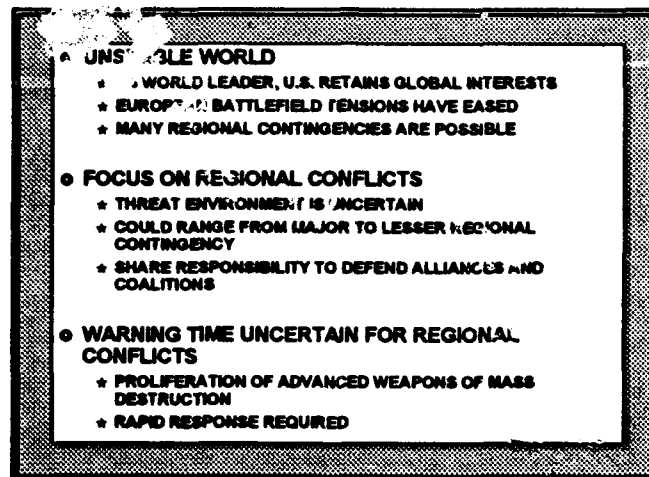
Fortunately, in practice the process is usually not that rigid. In Desert Storm, GAT personnel received their general guidance from the director of campaign plans, who got it either directly from the JFC or from the JFACC. The Kuwaiti cell's diary revealed how guidance turned into sorties. Sometimes the direction was very specific, allocating specific Air Force units against either regions or enemy units. "A-10s: AESE, AF5 136 (D); 6 AD, 53 AB, 12 AD 68 (N)" directed 136 daytime A-10 sorties against regions, and 68 night sorties against specific enemy units. Strategic attack sorties were usually put against more specific targets or target sets.¹⁴⁰ In that manner, the air tasking order oriented on desired results or objectives, not on meeting an administrative percentage to satisfy all components that each had gotten its "fair share" of the air effort.

Continuity and Planning Processes

Granted that synchronizing interdiction and maneuver is an important, yet difficult, process. There is a single factor not mentioned in the previous chapters that makes synchronization even more challenging. Air and land warfare are fundamentally different in terms of their chronological continuums. American air campaigns generally start before their ground counterparts, especially on the offensive. They precede land campaigns, and the air aspects of Desert Storm have continued long past the land campaign. Additionally, the air campaign is relatively continuous. Land combat is generally not as sustained.

Interdiction and the New World Order

Beyond the impact of Desert Storm, the collapse of the Soviet Union and several other factors complicate all military planning. Has this transition invalidated any of the lessons cited herein? Figure 4-11 presents a brief list of relevant changes.



Source: ACC Munitions Roadmap Briefing.

Figure 4-11. National Security Environment

Do any of the above environmental factors affect planning for interdiction operations? With an uncertain threat, limited warning time, proliferation of weapons of mass destruction (WMD), and the requirement for a rapid response, unity of command for interdiction operations is even more critical. It is difficult to imagine any circumstances where the US Army would conduct combat operations without an Air Force presence. The Air Force should always be present to provide JFACC command and control for Army forces. In the event the forces are predominantly or exclusively Marine, a Navy JFACC can provide similar oversight of a comprehensive interdiction effort.

Summary

Desert Storm marked an important turning point in interdiction theory and practice. The night, once the sanctuary for ground forces, became hell as unseen aircraft could attack them with precision. Infrared and radar systems left them no place to hide. The precision meant that interdiction aircraft could strike more targets more rapidly with better results. This progress carried a price. The bomb damage assessment system was hardly a system at all. The services and national agencies could not agree on criteria, and it was difficult to disseminate BDA information to all of its users. High-threat mobile missiles presented a very difficult and critical target, and the interdiction effort struggled to meet that challenge. Finally, the rapidly moving ground campaign pushed the air component's limits for responsive control measures.

The end result was a stunning military victory over the fourth largest army in the world. The triumph set the stage for another battle, this time among the victors. The years immediately after Desert Storm were filled with doctrinal bickering, disagreement about why the coalition forces were successful, and competition for a shrinking budget. Some of the measures, in particular establishment of joint target coordinating boards, seems destined to lessen the effectiveness of interdiction.

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Chapter 5

Conclusions and Recommendations

The objective of military efforts should always be victory, as defined by meeting stated national objectives. Supporting elements of military operations, like interdiction, must also be objective-based to best serve the overall goals. The best way to do that is to ensure unity of command, first over the total effort (through the joint force commander) and then over the distinct subordinate aspects of the campaign.

For every objective, ensure unity of effort under one responsible commander.

FM 100-5 (May 1986)

In regard to unity of command over subordinate aspects, the question then becomes how to divide those concerns. Shall they be separated by color of uniform, geographically, or by the medium of operations? The best answer is delineation by the nature of objectives, refined by geographic and medium of operations criteria. The nature of Navy littoral operations is fundamentally different from Marine Corps amphibious operations, just as amphibious ops differ from Army land combat operations. Superficially, those are geographic separations; in reality the distinctions are mostly functional. The operations in each functional division almost always require forces, weapons, and support from at least one other component, but *someone* has to be in charge. The unique combat and combat support environment and concerns in each case are best met by giving unity of command to the component with the preponderance of troops, training, and interest in that medium.

What of interdiction? Is it a significantly unique form of combat operation that requires unity of command? Clearly that is the case. Killing 30,000 Chinese in Korea was relatively meaningless because the effort was not clearly linked to the overall theater objective. Instead, as has often been the case, interdiction's *subordination* to the land combat effort actually limited its ability to serve the overall theater objectives.

The Army's discontent with the JFACC running interdiction, to include fires beyond the FSCL, stems from an outdated perspective. The corps commanders no longer reign supreme. The joint force commander is more than a planner limited to spectating during the daily execution of his plans. Modern communications allow him to participate fully in the daily execution of a campaign. Therefore, he can provide relatively continuous direction to all his components, including the land component commander and any assigned corps.

The ability to provide continuous unity of command over joint operations does not eliminate the need for trust, it increases it. Instantaneous communication accelerates the pace of battle, and there simply is not time for warfare by committee. Once given the

JFC's direction, the land commander must trust the JFACC to uphold his end of the joint bargain. Unfortunately, that trust is absent, as it has been for decades.

Now the Pentagon has two tactical air forces: the U.S. Army's, which works, and the U.S. Air Force's, which is all show and no go and is not trusted to do the job by the grunts or their leader.¹

That quote from David Hackworth on air power's utility in Bosnia may be something of an overstatement, but it does accurately reflect the fundamental lack of trust Army officers have in *any* fire support not directly under their control. After one year of research and this many pages, that is the central conclusion of this study. Trust is the key to synchronized interdiction and land warfare. Given that premise, there must be some specific remedies. It is not enough to say, "Can't we all just get along?" Any proposals must consider what has and has not changed over the years, and therefore observations on the evolved nature of effective interdiction and deep battle precede the recommendations.

The Nature of Interdiction

The nature of interdiction has changed more over the past 20 years than during its entire preceding history. There remain constants, however, that describe the impact interdiction has on the course of battle, and suggest the most plausible interdiction objectives. Even when the definition is expanded to include land- and sea-based attack aircraft, long-range bombers, cruise missiles, and surface-to-surface missiles, theater air interdiction against enemy forces before they can engage our forces should draw on the lessons of traditional interdiction since World War I.

What Has Not Changed

Certain aspects of interdiction have not changed, and some of those are directly applicable to surface-delivered deep fires.

- All aircraft capable of delivering air-to-surface weapons can perform interdiction. Bombers, fighters, fighter bombers, and gunships can all perform interdiction depending on the circumstances. The Air Force acknowledged that fact on a grand scale by reorganizing Strategic and Tactical Air Command "shooters" into the Air Combat Command.
- Interdiction is most effective when enemy forces must move. Often stated as being most effective when tied to ground force maneuver, that definition implies that it must be ground force maneuver (friendly) that puts the enemy on the march. In reality, the enemy's own initiative, tactical deception, or a number of other factors can smoke them out. Further, it is very important that combat elements must be moving, not simply supplies as complete supply denial remains extremely difficult.

- Armed reconnaissance is often the most effective method of timely and effective interdiction. High technology systems like Joint STARS, LANTIRN, and improved fighter radars can improve the probability of successful armed reconnaissance.
- Accurate bomb damage assessment is difficult. Precision munitions have made BDA even more difficult, as they may leave a smaller entry wound. Sophisticated decoys further complicate accurate assessment. National surveillance systems provide exceptional capability, but their sensitive nature makes it difficult to integrate that information into mission planning at lower levels.
- When the Army and Air Force share targeting interests, friendly fire incidents and targeting redundancy are likely.

What Has Changed

Aspects of interdiction and deep battle that *have* changed:

- High technology systems, such as LANTIRN, deny the enemy the sanctuary of the night. Desert Storm provided ideal weather and terrain for night combat operations, and that may not always be the case. Even so, infrared and radar systems for target surveillance, acquisition, and weapons delivery have led to a fundamental role reversal.
- Electronic command, control, and means of communications present a vulnerable interdiction target. The effectiveness of attacks on such systems depend upon the enemy's level of reliance and system redundancy.
- Airborne and space-based reconnaissance systems make information beyond the forward line of troops much more accessible to ground commanders.
- Precision munitions increase interdiction lethality, and cluster munitions improve the countermobility effect. However, the precision gives a greater importance and comprehensive (theaterwide) BDA as few aircraft can effectively attack more targets.
- Long-range artillery systems, helicopters, and fast land vehicles have dramatically increased the speed and depth, but not the duration, of land force maneuver.
- Weapons of mass destruction and long-range delivery systems complicate the interdiction mission and make timely targeting critical. The American

preoccupation with low friendly casualties places additional burdens on interdiction, especially given WMD proliferation.

The requirement for centralized control of the interdiction effort, by a joint force air component commander makes the mistrust important. Given the constants and deltas cited above, is that requirement still valid? The answer is an emphatic "Yes!"

The JFACC has access to the best targeting information and the majority of the execution assets. Unlike the LCC, his view of the battlefield does not stop at a boundary of ground operations, but extends throughout a theater of operations. This is not an indictment of ground commanders; their views *must* be limited in some means to keep their problem manageable and maintain battle focus. Centralized JFACC control will not be effective enough for the challenges of the next century if the Army and Air Force are unable to break the trust barrier.

Recommendations

The Air Force must serve as the proponent for unity of command of interdiction, and therefore must develop a strategy to accomplish unity. Figure 5-1 portrays the elements that strategy must encompass.

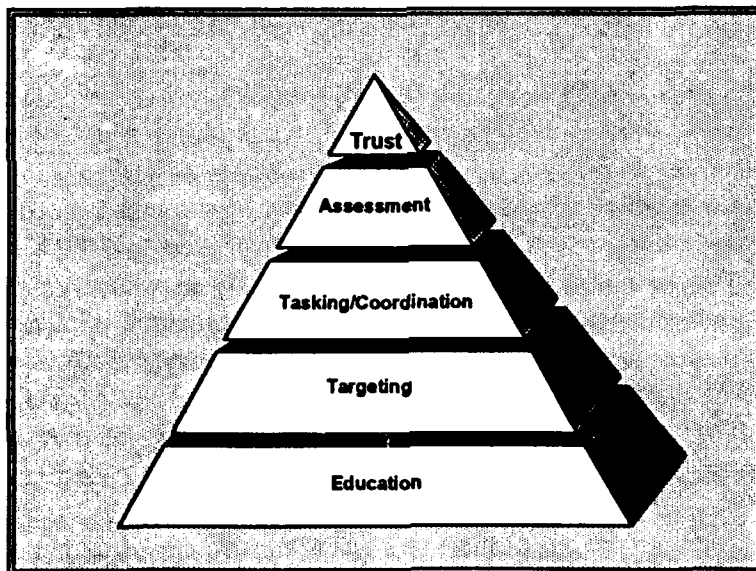


Figure 5-1. Unity of Command Strategy

Education.

Even if this study has made an effective argument for unity of command, it is up to the Air Force to convince the Army. The junior service must demonstrate their commitment to joint success. The first step must be a complete review of Air Force doctrine to ensure that it conveys the proper meaning and demonstrates commitment to joint goals, not

service self-aggrandizement. Doctrine can be further refined to show the connectivity between air operations and surface warfare. That connectivity does not have to come in the form of integration, simply in the focus on the joint force commander's operational and strategic objectives. Additionally, although not written with the Army as its primary audience, Air Force doctrine should stress why interdiction can enhance surface operations so much more effectively than close air support.

The current volumes of AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force*, actually do a reasonable job in the above regards, but obviously that has had little impact on the Army. Air Force leadership should expand its aggressive campaign to sell the JFACC concept *in its entirety* to the other services. Easier said than done, perhaps, but some specific steps are available. The first is simply a media blitz in sister-service publications. Those periodicals should have articles in every edition presenting the Air Force view, not in an emotional manner, but in an effort to sell a reasonable approach to a doubting audience.

Writing about the JFACC's ability to enhance surface operations through unity of command of the air effort will not be enough. Senior Air Force leaders need to get some face time in front of the customer. If they are not already scheduled, numbered air force commanders should be routine speakers at the Command and General Staff College, and all three sister-service war colleges. More importantly, at least one Air Combat Command general officer should speak to *every* Army Pre-Command Course (PCC) at Fort Leavenworth. The PCC prepares officers selected for battalion and brigade command, and provides the ideal forum to present the Air Force view. It will also allow potential JFACCs to face the slings and arrows of the people they *must* convince.

That public relations effort to sell the need for unity of command bleeds over into the second pillar of the strategy, education. The education process will be a two-front war. On the Air Force's home front, future JFACCs need early exposure to surface warfare concerns. That can happen in a classroom, or through practical application as an Air Liaison Officer. It may be a bit extreme to say that every USAF fighter squadron commander should have served a tour as an ALO, but not very. To overcome the Army's distrust, the Air Force must put its best people where its mouth is, so they are prepared to understand the Army's concerns and requirements when they are called upon to support them in battle.

The Army is very remiss in the area of education as well. Army instruction is no longer offered at either the Pre-Command Course, or the Combined Arms and Services Staff Support School (CAS³, roughly equivalent to the Air Force's Squadron Officer School (SOS)). It is impossible to understand how the Army, so vocal in its complaints about Air Force support, might think the situation will improve by limiting their officers' exposure to Air Force instruction. While the services all send officers to other intermediate and senior service schools, the exchange should begin earlier. Air Force officers should routinely attend CAS³, and Army officers, SOS. The gains in early interservice cooperation will be well worth the cost.

Targeting.

One area where a specific change in doctrine is in order is the concept of strategic attack. Strategic attack targets are in reality interdiction. They may be deeper, or have a broader impact, than most interdiction targets, but the objective remains the same. Striking an electrical power station that disrupts command and control subsequently delays and disrupts enemy leadership efforts. Labeling these missions strategic attack conveys an unnecessarily lofty image, and gives the impression of disassociation from other combat operations. The Air Force should drop references to strategic attack, and categorize various depths of interdiction if necessary.

Tasking and Coordination.

The efforts to improve targeting should not stop with the acquisition of targets, but must include the communication process for all players. Additionally, the services must establish and accept common interdiction goals without concern for how they are accomplished or which service might take credit for the achievement.

This overall effort, if it will be successful, must remove command over theater air interdiction from consideration as a zero sum game. The differing perspectives of the services are not the product of nefarious intent or ignorance. The concerns of each service are not superficial nor are they mutually exclusive. The "grunts" Hackworth referred to will benefit as much or more than the Air Force from an efficient JFACC-managed interdiction effort. For such an effort to work, the services must refine the structures and processes to inspire and reinforce trust, without disenfranchising the Army. The first step in reinforcing trust must be to eliminate the JTCB. The Joint Targeting Coordination Board is an oversight agency, designed to compensate for, rather than rectify, the lack of interservice trust.

It is time to orient aerospace operations on their objective rather than on the mechanical execution of tasking. The first step is elimination of the concepts of apportionment and allocation, explained in Chapter 4. Reducing aerospace tasking to number crunching decreases the probability that aerospace leaders will develop a coherent, comprehensive air effort. The JFC does not saddle his other component commanders with such rigid guidelines, and should not handcuff the JFACC. Imagine a corps commander being told that he would have to devote a given *percentage* of his combat forces to a specific mission category!

Desert Storm highlighted the need a cadre of professionals oriented to developing and executing a comprehensive air effort. At the numbered air forces, the administrative people to do the very necessary work preparing, generating, and distributing the air tasking order already exists. They are not trained or suited for the conceptual aspects of air effort development. The services should maintain a professional fully integrated joint staff to do work similar to that of Colonel Warden and the "Black Hole" staffers. Permanently constituted at numbered air forces or gathered periodically for major exercises and training periods, their first meeting should *not* be to plan an air effort in an actual contingency! It is just as important that the initial planning be joint from the outset.

During execution, the existing definition of the fire support coordination line has worked well, the land commander should retain control of its placement. However, to ensure ground commanders reconcile the benefits of a deep FSCL with the constraints it places on Air Force employment, a restriction is in order. Fixed wing attack aircraft should not be employed within the FSCL *without direct control*. This land component commander could lift this restriction in an emergency.

Assessment.

Finally, the services must train better for indirect fire assessment (IFA). The obvious initial move is a definition under that heading rather than outdated battle or bomb damage assessment. Redefined as indirect fire assessment, training for the process should have the same importance as training for the delivery of the fires themselves. Every major exercise should include IFA, and Air Force operational readiness inspections should address tactical unit ability to gather data and make fire assessment. All that will be in vain, however, if the armed forces cannot develop doctrine for indirect fire assessment that establishes joint criteria for making and using such assessments.

Recommendations for Further Study

This research fellowship provided an excellent opportunity to review Air Force doctrinal foundations, and highlighted one of the services' greatest doctrinal shortcomings. There is simply not enough breadth to Air Force writings. If it were not for Craven, Cate, and Futrell, perhaps the Air Force would have no doctrine. Their works are cited time after time as bases for doctrine, and the firsthand accounts of principles like those of Weyland and Momyer are just as over used. These sources are important--they are cited in this very paper. However, the USAF should seek opportunities to reemphasize original research from primary source documents. A wealth of documents exist, and the serve needs to revitalize research into those documents. That emphasis should come from the School for Advanced Airpower Studies *and* the students of the Air War College. Studies like Clodfelter's and Tilford's are essential to sound decision making. In addition to encouraging new research, the Air Force must accept dissent if it is to avoid repeating the well-intentioned mistakes of the Air Corps Tactical School.

Summary

The beauty of academic endeavors such as this study is that they need not solve problems, only identify them. While some of the demands upon interdiction forces are new, the basic problems of targeting, coordination, assessment, and trust are not. Waving this paper at the problems is unlikely to have much impact. If the US military is to provide efficient and effective interdiction, then it will take a concerted effort without regard to parochial biases to implement true unity of command.

Hopefully, this study shows how US Air Force air interdiction evolved, and how interdiction capabilities and requirements relate to US Army deep operations. The structures and processes for synchronization of deep operations and air interdiction must allow unity of command over the interdiction effort, and an empowered JFACC with a

joint staff would do so. However, unless the two services overcome their lack of trust, no practical measures can improve that synchronization.

Notes

¹David H. Hackworth, "Air Power Just Won't Work," *Newsweek*, 17 May 1993, 32.

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